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Labrador Current Variability Study: Current Meter Observations October 1985 to January 1986

R.R. Lively and B. Petrie

Physical and Chemical Sciences Branch
Scotia-Fundy Region
Department of Fisheries and Oceans

Bedford Institute of Oceanography
P.O. Box 1006
Dartmouth, Nova Scotia
Canada B2Y 4A2

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Canadian Data Report Of Hydrography and Ocean Sciences

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Les établissements des Sciences et levés océaniques dans les régions et à l'administration centrale ont cessé de publier leurs diverses séries de rapports en décembre 1981. Une liste complète de ces publications figure dans le volume 39, Index des publications 1982, du *Journal canadien des sciences halieutiques et aquatiques*. La série actuelle a commencé avec la publication du rapport numéro 1 en janvier 1982.

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R. R. Lively and B. Petrie

Physical and Chemical Sciences Branch
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Department of Fisheries and Oceans

Bedford Institute of Oceanography
P. O. Box 1006
Dartmouth, Nova Scotia
Canada, B2Y 4A2

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ABSTRACT

Lively, R. R. and B. Petrie 1990. Labrador Current variability study: current meter observations October 1985 to January 1986. Can. Data Rep. Hydrogr. Ocean Sci. No. 91: v + 146 pp.

Statistics of current speed and direction, temperature, salinity and pressure are presented for an array of 9 current meter moorings located on the continental slope of the eastern Grand Bank in Flemish Pass. The statistics include means, extrema, and standard deviations of the basic and low-pass filtered data series. Time series plots of all variables, progressive vector diagrams, joint distribution diagrams of the velocity components and of temperature and salinity are also included. In addition, tidal analysis of currents, temperature, salinity and density are presented.

RÉSUMÉ

Lively, R. R. and B. Petrie 1990. Labrador Current variability study current meter observations October 1985 to January 1986. Can. Data Rep. Hydrogr. Ocean Sci. No. 91: v + 146 pp.

Des statistiques sur la vitesse et la direction des courants, la température, la salinité et la pression sont présentés pour un réseau de 9 courantomètres amarrés sur le talus continental dans l'est du Grand Banc dans le col Flamand. Les statistiques comprennent les moyennes, les extrêmes et les écarts-types des sèries de données de base et de données filtrées passe-bas. Des diagrammes vectoriels progressifs, des diagrammes de distribution conjointe des composantes de vitesse, et de température et de salinité, sont aussi présentés. En outre, une analyse tidale des courants, de la température, de la salinité et de la densité est effectuée.

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Introduction

The Labrador Current Variability Study was a joint project of Petro-Canada, Mobil Research and Development Ltd., Esso Resources Canada Ltd., Husky/Bow Valley and the Department of Fisheries and Oceans. The project had two main purposes:

i) To obtain basic measurements of the currents on the eastern slope of the Grand Bank which is swept by the Labrador Current; and,

ii) To determine how the currents on the adjacent shelf are influenced by the Labrador Current.

Oil exploration in the Hibernia area, where the water depth is about 90m, had been moving eastwards towards deeper water. Esso planned and carried out a drilling program on the 1000m isobath due east of Hibernia in 1986. This area is known to lie in the path of the Labrador Current (see, for example, Greenberg and Petrie, 1988) whose strong flows could present operational difficulties and, if oil were discovered, influence the design of production facilities. It is also known that the Current occasionally moves onto the shelf. An array of moored current meters (Fig. 1) was designed to measure the flows associated with the Current in its mean position over the slope as well as to obtain an estimate of the magnitude, frequency and duration of its meanders onto the shelf. Data were collected from September, 1985 to February, 1986.

The overall logistics of the program were handled by Petro-Canada who hired and supervised Dobrocky Seatech to run the field program. In addition, Petro-Canada supplied 3 moorings (PC-1 to PC-3) with 9 current meters to the array and made shiptime on their supply vessels available. Mobil Research and Development Ltd. provided 3 moorings with a total of 3 vector-averaging current meters to measure the near-surface flows at sites LC-3, LC-5 and LC-6. Esso Resources Canada Ltd. lent financial support for

the program and replaced mooring LC-4 with one of their own when they began their summer drilling program. Husky/Bow Valley provided shiptime on their supply vessels and financial support to the program. The Department of Fisheries and Oceans supplied 6 moorings (LC-1 to LC-6) with a total of 19 current meters; in addition, one mooring, LC4, was reset after recovery of the first array. This mooring was to remain in place until recovered by Esso at the beginning of their drilling program. Their replacement, which was to last through the drilling season, along with the 2 earlier deployments could have yielded a one year time series of current at the 1000m isobath.

Mooring Locations

In total, 15 current meter moorings and 14 guard buoy moorings were set at 9 separate sites (Table 1, Fig. 1). Note that the Bedford Institute moorings are given two designations, either LC-1 to LC-6 or consecutive mooring numbers 710-716 with 713 omitted. Coupled current meter moorings, one with a near-surface instrument, the other with deep meters, were placed at sites LC-5, LC-6, PC-1 (guard buoy coupled as well) and PC-3. At PC-2, 2 moorings consisting of a current meter mooring coupled to a guard buoy mooring were set. Separate current meter and guard buoy moorings were placed at sites LC-1 to LC-3. No guard buoys were used at PC-3, where a drilling rig provided protection, and LC-4, where it was thought that the water was too deep for any fishing activity.

The guard buoys consisted of 1.47m diameter spheres each equipped with radar reflectors and flashing lights. The current meter types and depths are shown in Table 1. The compasses of the Aanderaa current meters on moorings LC-1 to LC-6 were swung after recovery. None of the other instrument sensors were calibrated and manufacturers' specifications are assumed to be applicable.

Data Return

The data returns (Fig. 2-5) for rate, direction, temperature and salinity were 34, 44, 48 and 45%, respectively, of the potential return. The majority, if not all of this loss, can be attributed to fishing gear hitting the moorings. This was completely unexpected as a survey of past fishing patterns indicated no vessel activity in the mooring area during fall and winter period. However, during the winter of 1985-86, the pattern changed with heavy fishing occurring in Flemish Pass, the site of the mooring array. In the following fall and winter season, the vessels returned to their normal fishing grounds on the shoulder of the Grand Bank.

In all, 10 current meters were lost, 1 from the Petro-Canada moorings and 9 (3 belonging to Mobil Oil) from the Fisheries and Oceans moorings. Only one of the near-surface current meters (PC3 site) had any data return. Unfortunately, all of the instruments on LC4 were lost during the first deployment. The second deployment of LC4 was terminated after 2 days because of heavy fishing activity in the area and the likelihood that the mooring would not survive an extended deployment. The Esso mooring which was set during the drilling season at the LC-4 site suffered complete instrument failure. Only 2 of the 14 guard buoys were recovered, one severely damaged and freely drifting.

Data Processing

Initial processing of the data was completed by Dobrocky Seatech Ltd. and presented in a 2 volume data report (Dobrocky Seatech, 1986) for Petro-Canada. These reports contain time series plots of all measured variables in raw form and after despiking (plotted at a scale of 15 data days/page), compilations of basic statistics, progressive vector diagrams,

histograms of the rate and direction, and of temperature and salinity by month, persistence diagrams of the rate and direction by month, exceedence diagrams of rate and occurrence diagrams of direction. This makes for a reasonably complete presentation but is cumbersome to use as, for example, a record which ran for the approximately 100d mooring period takes up about 60 pages. Moreover, the report has had limited distribution. Our data report repeats some of the analyses such as the basic statistics, progressive vector diagrams, edited time series plots of all variables, and histograms of temperature and salinity. However, the time series plots are confined to 1 page and the histograms cover the entire data span. In addition, we have added tidal analysis, time series plots of low-pass filtered data and their statistics, histograms of the U (positive eastwards) and V (positive northwards) components of current, plan and cross-sectional views of the mean flows, and plan views of the standard deviations along the principal axes of variance. This document is more compact and complements its predecessor.

The edited data records from Dobrocky Seatech were converted to Bedford Institute's internal current meter format and re-examined for errors. All time series were filtered to 3 common sampling intervals of 20 minutes, 1 and 6 hours. The latter was done with a Cartwright low-pass filter which passes 25% of the power at 28.4h. Harmonic analysis was used to determine tidal amplitudes and phases. More details of the filtering and analysis techniques can be found in Lively (1988).

Data Presentation

The data from the Labrador Current Variability Study are presented in graphical and statistical form in the following order:

a) Table of mooring positions, water depths, instrument depths (nominal for the LC moorings and for PC-1, 260m; actual depths for the remaining PC

moorings' current meters) and instrument types; figures depicting the data return;

b) Plan views of mean currents at 3 depth levels;

c) Cross-section of the mean along-isobath and cross-isobath flows;

d) Plan views of the standard deviations resolved along the principal axes of variance at 3 depth levels and based on the 20 minute data;

e) Table of tidal constants for current, temperature, salinity and density;

f) For each instrument. at each mooring site, basic information such as instrument type, location, start time, duration and sampling interval is given. In addition, statistics and time series plots of the edited and low-pass filtered data, progressive vector diagrams (20 minute data), stick plots (6h low-pass data) and two parameter plots (20 minute data) of rate and direction and of temperature and salinity are presented.

Discussion

The mean currents in plan and cross-sectional views (Fig. 6-10) show a strong Labrador Current over the slope with steady flows over the mooring period of up to 0.46 ms^{-1} at LC-1, 100m. The core of the Current appears to be near the 400m isobath though flows in shallower water and farther out on the slope (observations at LC-4 only lasted 2d) have not been well-sampled. Earlier data from almost the same position as LC-4 showed mean southward flows of about 0.1 ms^{-1} over an 82d period at roughly 500, 800 and 1000m (Seaconsult, 1978). A stronger current of about 0.2 ms^{-1} was observed at 200m. The east-west currents (Fig. 10) are generally quite small and disorganized.

The magnitudes (Fig. 11-13) of the standard deviations along the major axes of variance are about 0.1 m s^{-1} at all depths. The largest component generally lies along isobaths.

There were several things that we learned from this joint program.

In retrospect, it would have been preferable to have a ship dedicated to the mooring operations rather than trying to set the array on an opportunity basis from the supply vessels. The ship could be either from Fisheries and Oceans, the oil companies or chartered. All moorings were scheduled for a September deployment however, after setting only PC-3, the supply vessel was redirected to other tasks. This happened once more, about 4 weeks later, when LC-5 was moored. Finally, the rest of the array was set about 2 weeks later. In addition, because time was at a premium, some moorings were deployed in less than ideal conditions which may have caused some of the tapes to come off their reels and resulting in data loss.

We were completely surprised by the intensity of the fishing effort during the mooring period. The level of activity was a major departure from the past when fishing was prosecuted on the northeast shoulder of the Grand Bank with no effort in Flemish Pass. Moreover, the depth at which fishing was carried out was a surprise. A survey of past activity indicated little effort in waters deeper than 300m yet the evidence suggests that all of the sites along the 400m isobath and the 1 mooring at 1000m were interfered with by fishing gear.

The guard buoys were a total failure. Of the 2 recovered, one was extensively damaged and drifting freely, while the second was picked up from its site soon after being laid by a supply vessel which was not aware of its purpose. No trace was found of the remaining 12 buoys. More careful consideration will have to be given to the design of effective, durable guard buoys.

Acknowledgements

We would like to thank the many people who participated in this joint venture during the planning stages, the field program and the initial analysis of the data. These include representatives of Petro-Canada, Mobil, Esso, Husky/Bow Valley and Dobrocky Seatech. In particular, J. Buckley of Petro-Canada must be singled out for his efforts to keep the program coordinated. We also thank J. Lazier and D. Greenberg for the useful reviews they provided. The authors gratefully acknowledge the financial support of the Department of Energy, Mines and Resources, the Office of Energy Research and Development.

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TABLE 1

LABRADOR CURRENT MOORING ARRAY

STATION	LATITUDE	LONGITUDE	SOUNDING	INSTRUMENT DEPTH	INSTRUMENT TYPE*
PC-1	46°33.75'N 46°35.91'N	47°15.17'W 47°15.92'W	400 m	20 m 112 m 260 m 343 m	NBCM ACM ACM ACM
PC-2	46°34.80'N 46°34.60'N	47°48.60'W 47°48.90'W	140 m	20 m 67 m 120 m	NBCM ACM ACM
PC-3	46°26.72'N	48°30.96'W	93 m	20 m 80 m	NBCM ACM
LC-1 (710)	47°07.67'N	47°17.29'W	400 m	50 m 100 m 300 m	ACM ACM ACM
LC-2 (711)	46°51.63'N	47°16.95'W	400 m	50 m 100 m 300 m	ACM ACM ACM
LC-3 (712)	46°59.04'N 46°59.69'N	47°17.54'W 47°17.52'W	400 m	25 m 50 m 100 m 300 m	NBCM ACM ACM ACM
LC-4 (714)	46°59.01'N 46°59.14'N	47°08.33'W 47°07.72'W	1000 m	50 m 100 m 300 m 500 m 100 m+ 200 m+ 398 m+ 950 m+	ACM ACM ACM ACM ACM ACM ACM ACM
LC-5 (715)	46°58.85'N 46°58.99'N	47°33.35'W 47°33.35'W	215 m	20 m 45 m 95 m 145 m	MMB ACM ACM ACM
LC-6 (716)	46°59.55'N 46°59.77'N	48°00.34'W 48°00.40'W	140 m	25 m 50 m 100 m	MMB ACM ACM

* NBCM - Niel Brown Current Meter (ACM 2)
ACM - Aanderaa Current Meter (RCM 4)
MMB - Marsh-McBirney Current Meter
\+ Instruments deployed at these depths on Feb. 1, 1986 for 24 hours.

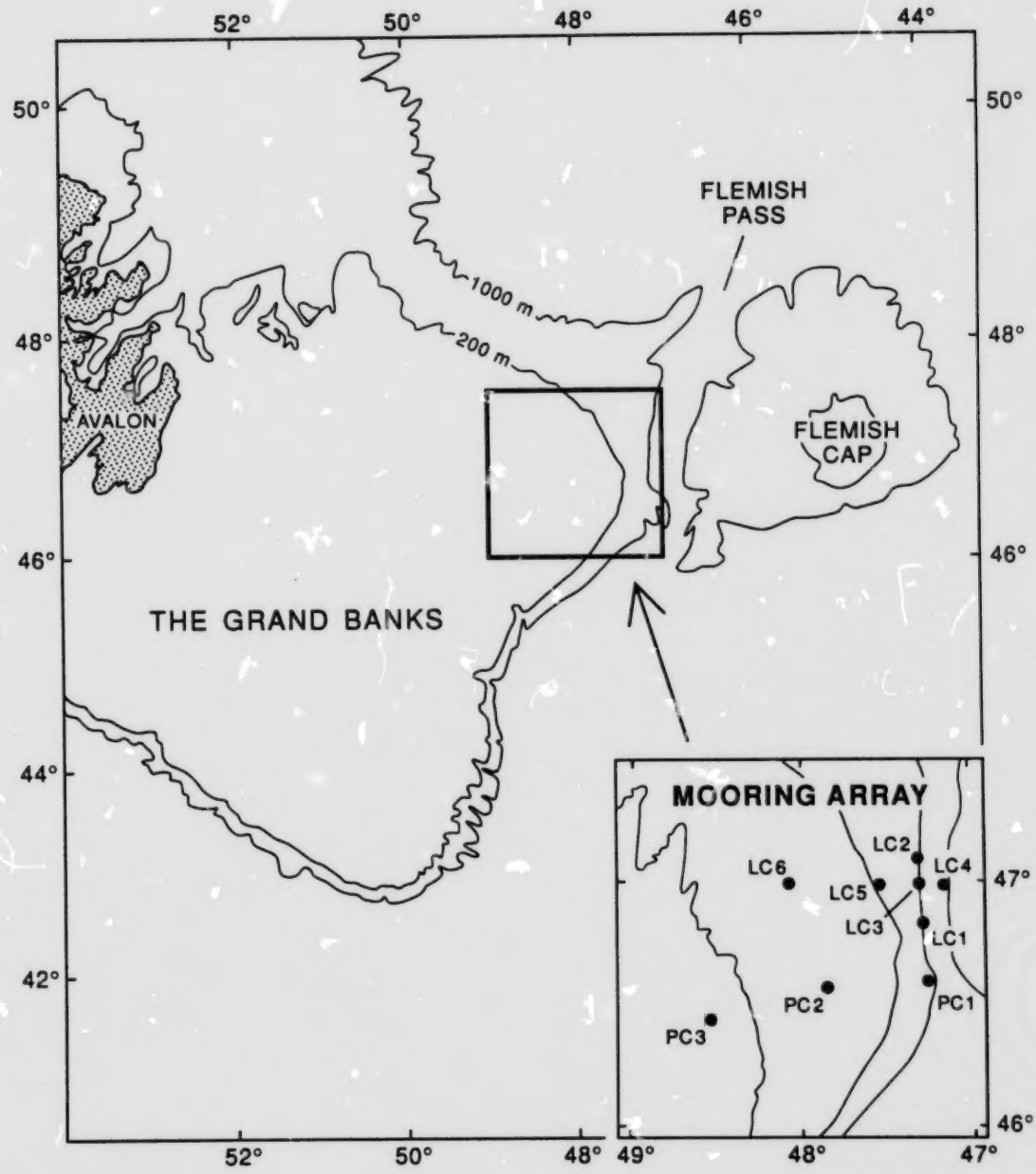

Figure 1. Study area and mooring array.

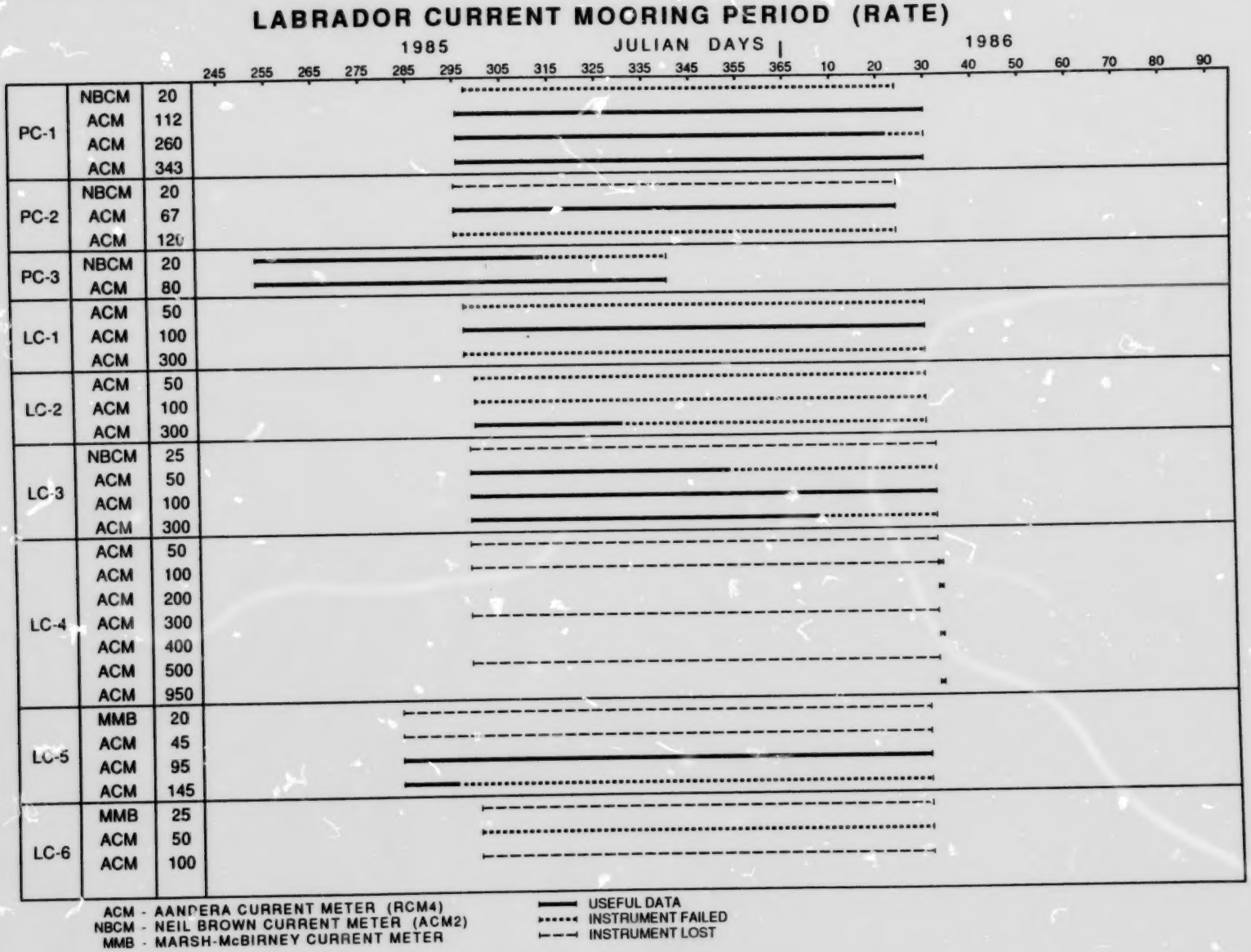

Figure 2. Data return for rate.

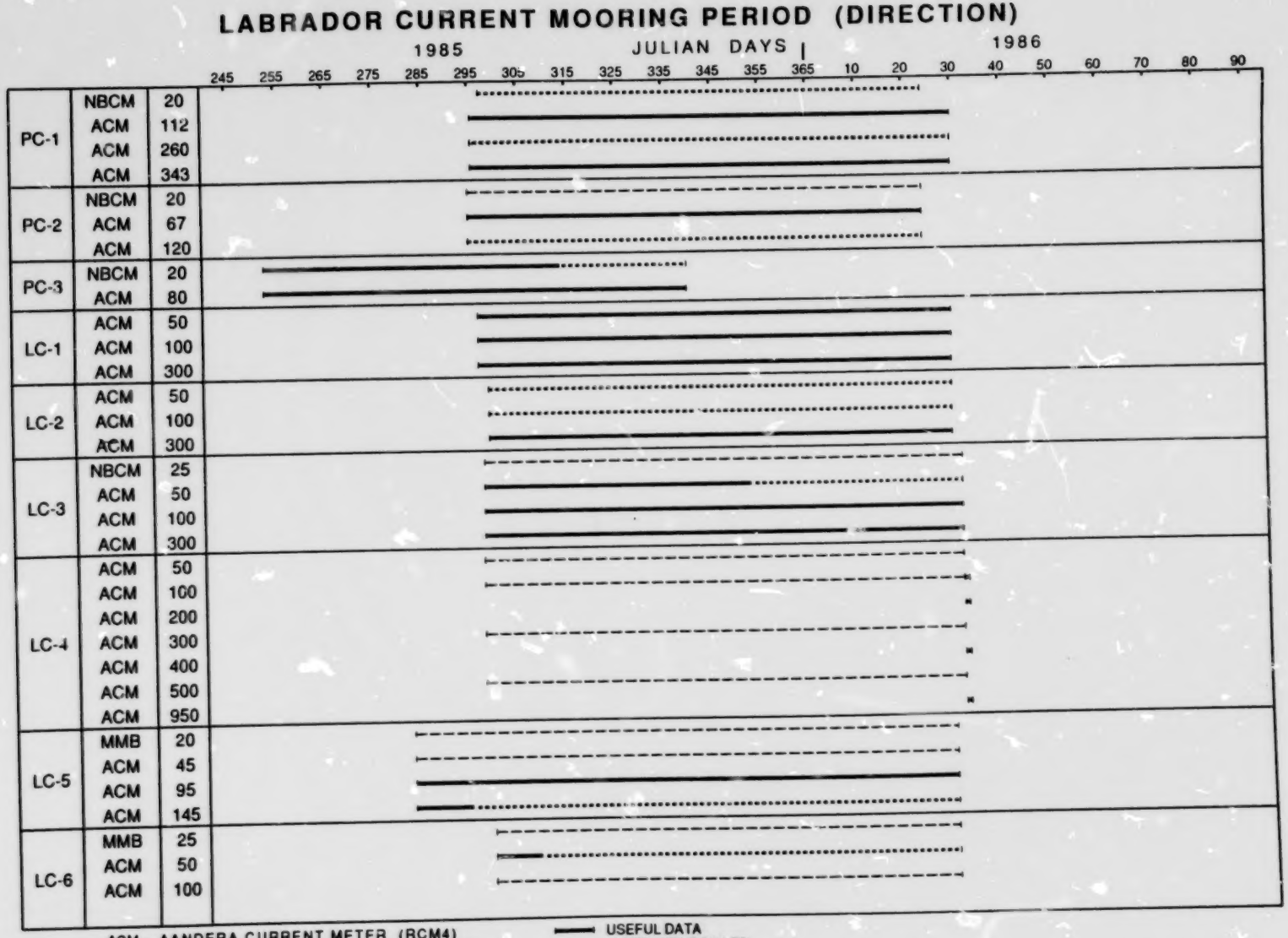

Figure 3. Data return for direction.

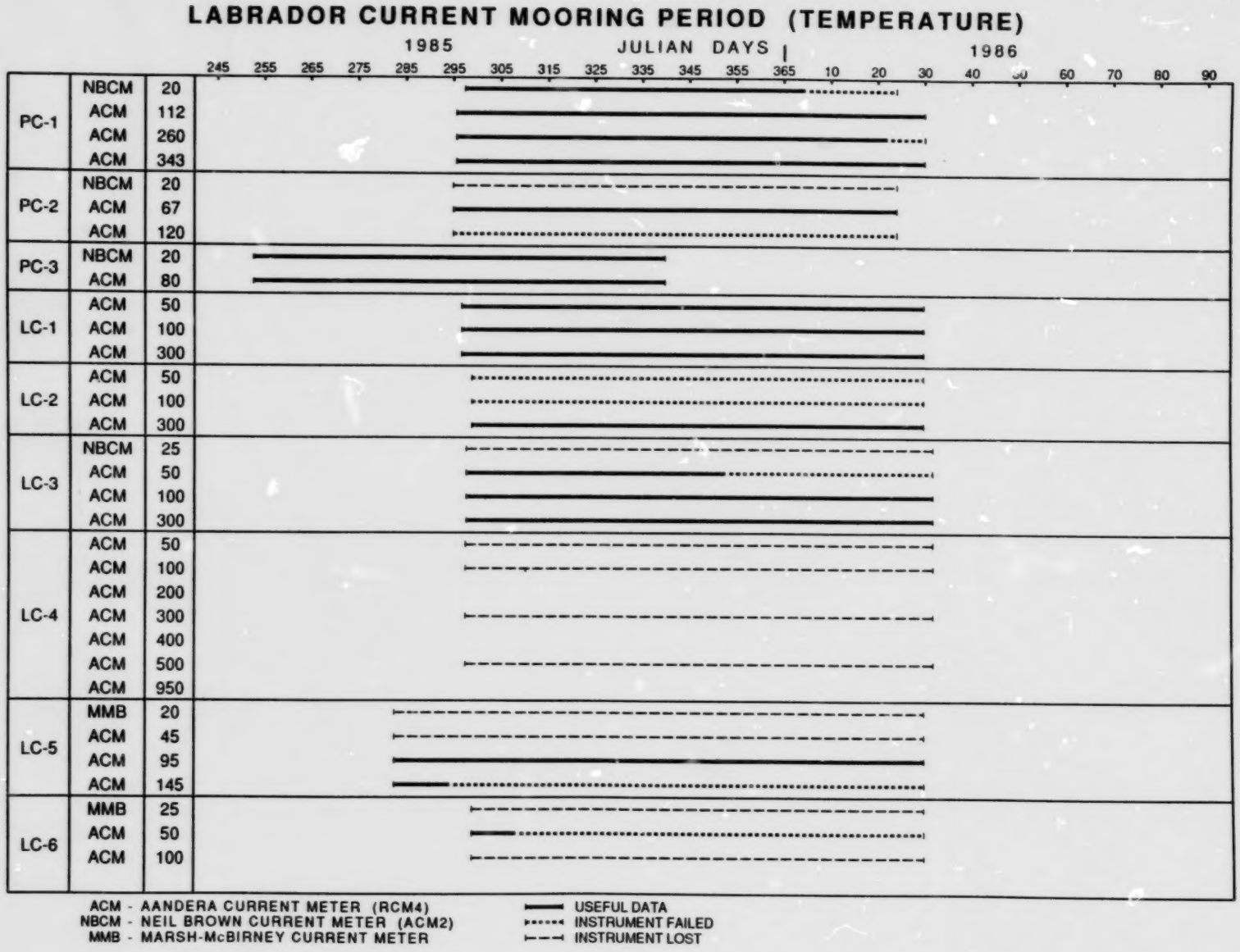

Figure 4. Data return for temperature.

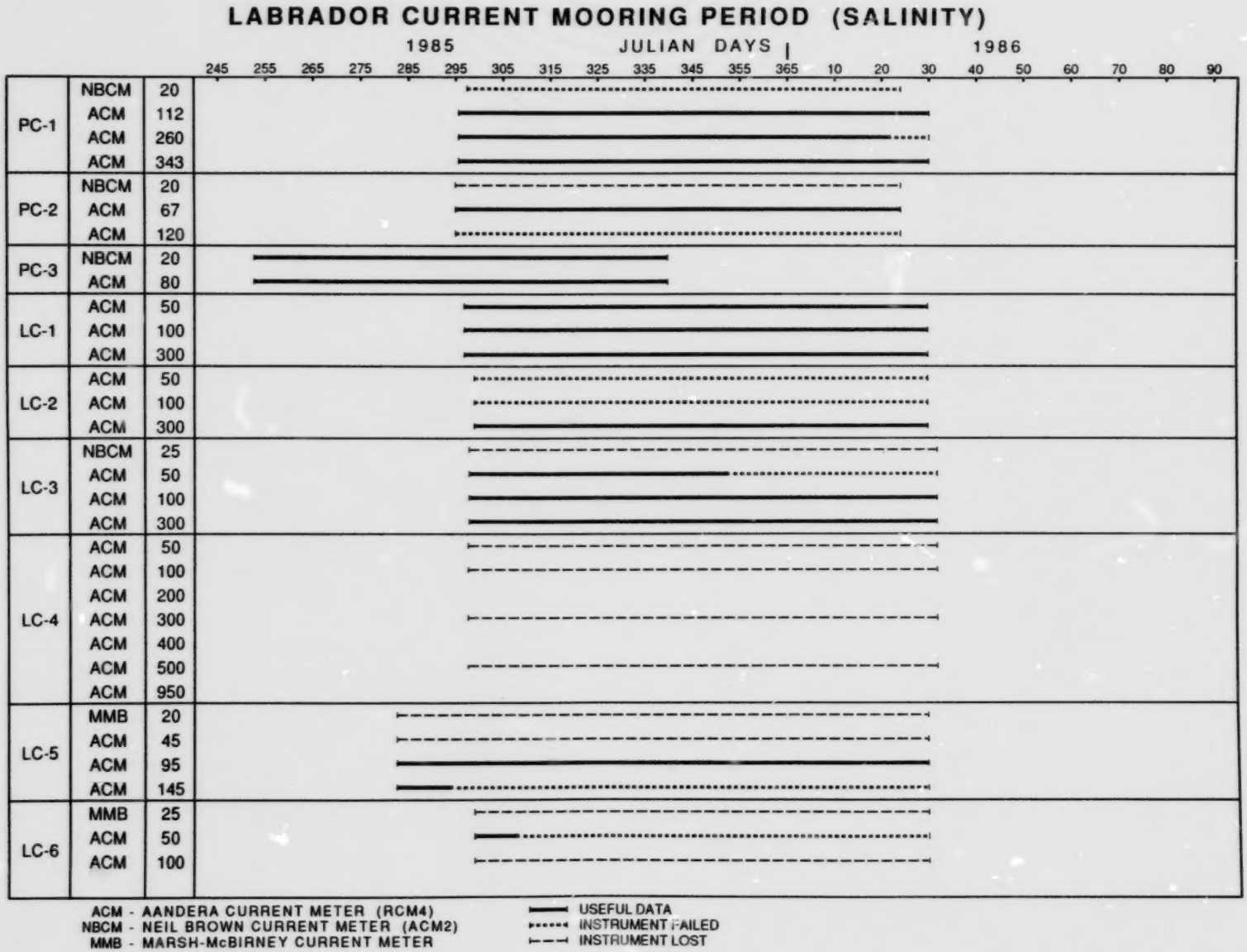

Figure 5. Data return for salinity.

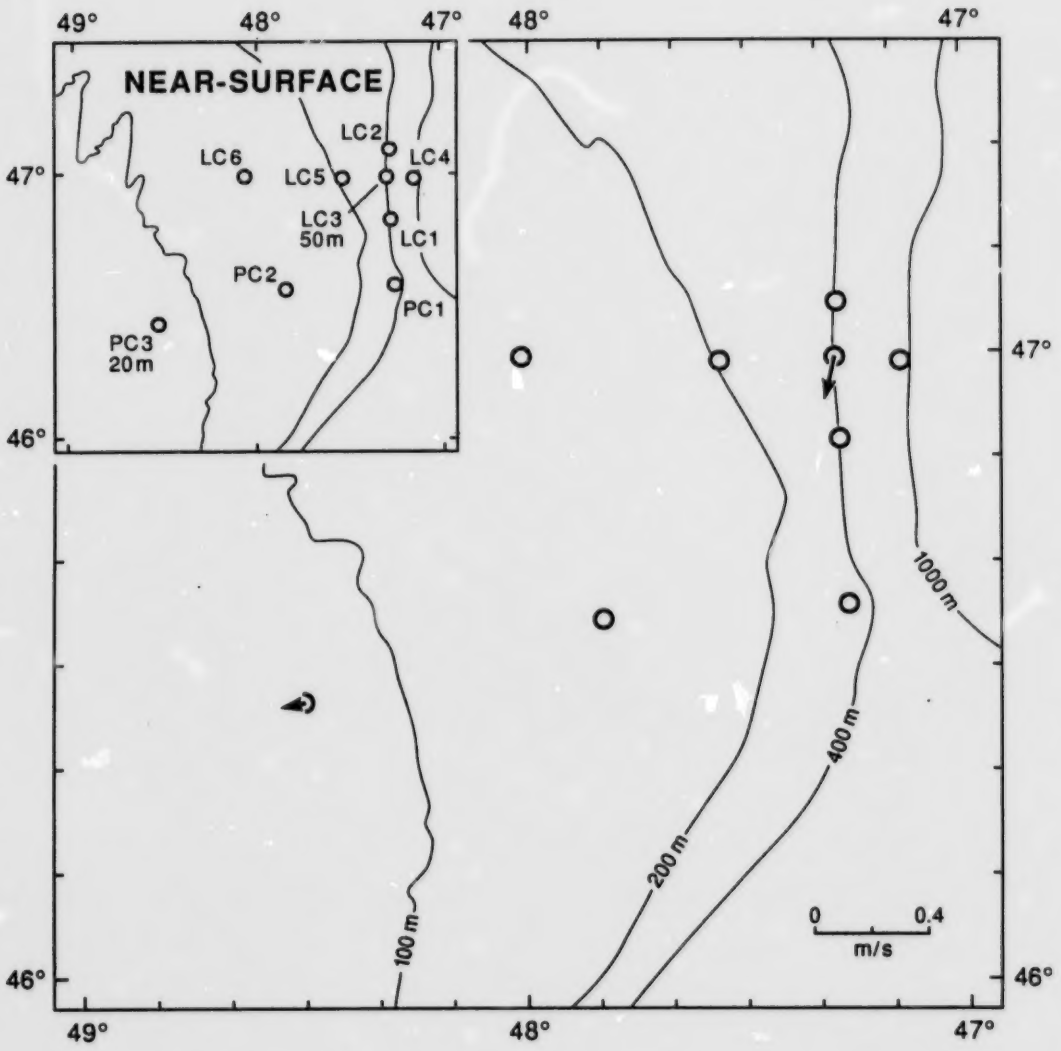

Figure 6. Plan view of near-surface mean currents.

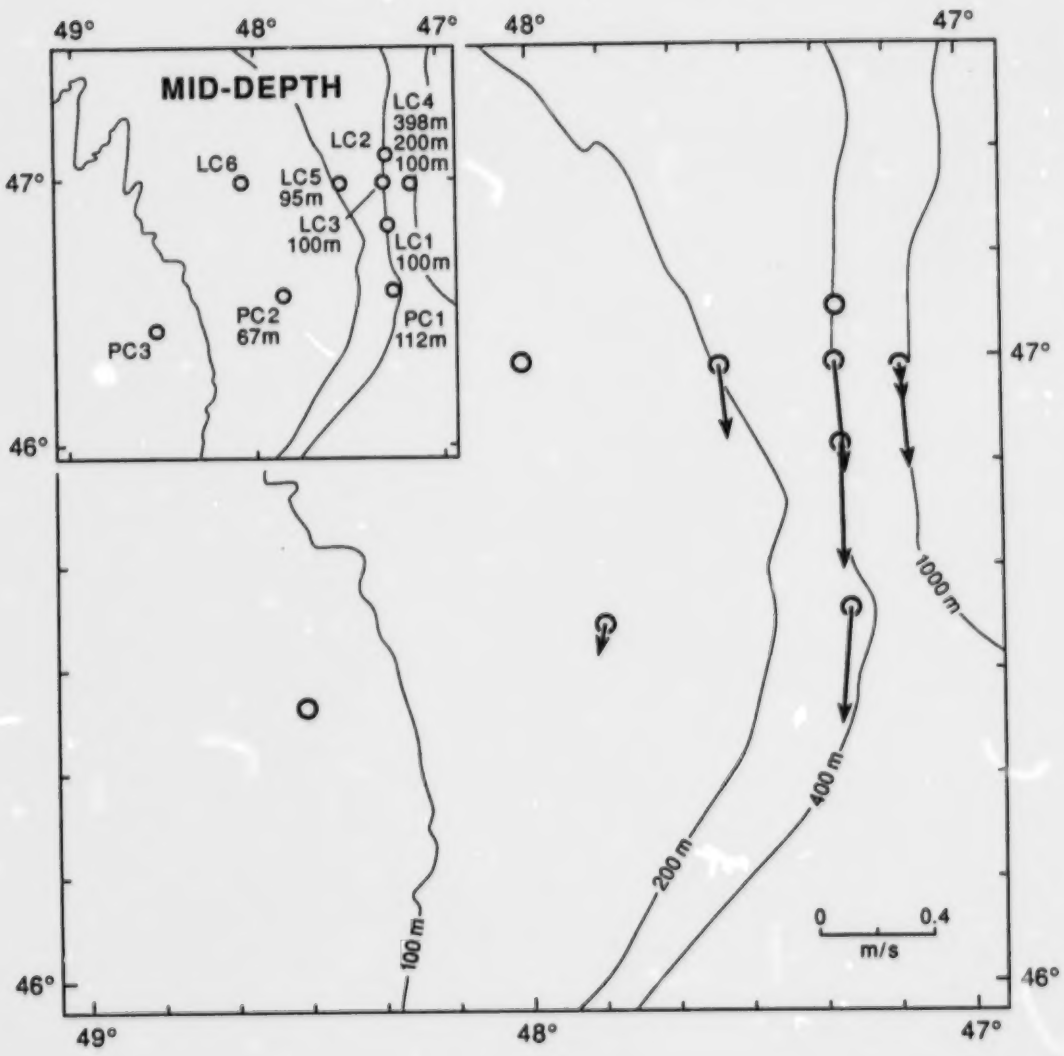

Figure 7. Plan view of mid-depth mean currents.

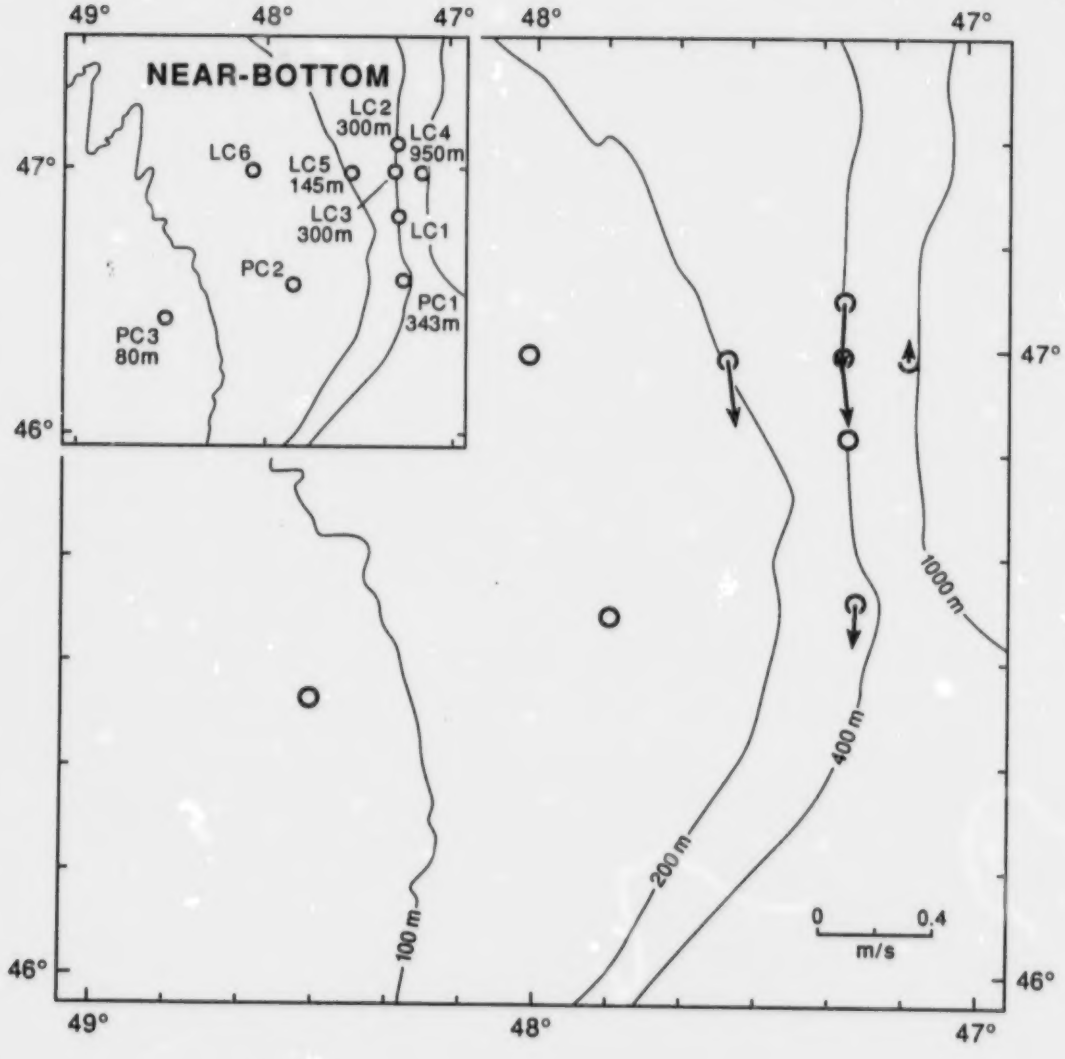

Figure 8. Plan view of near-bottom mean currents.

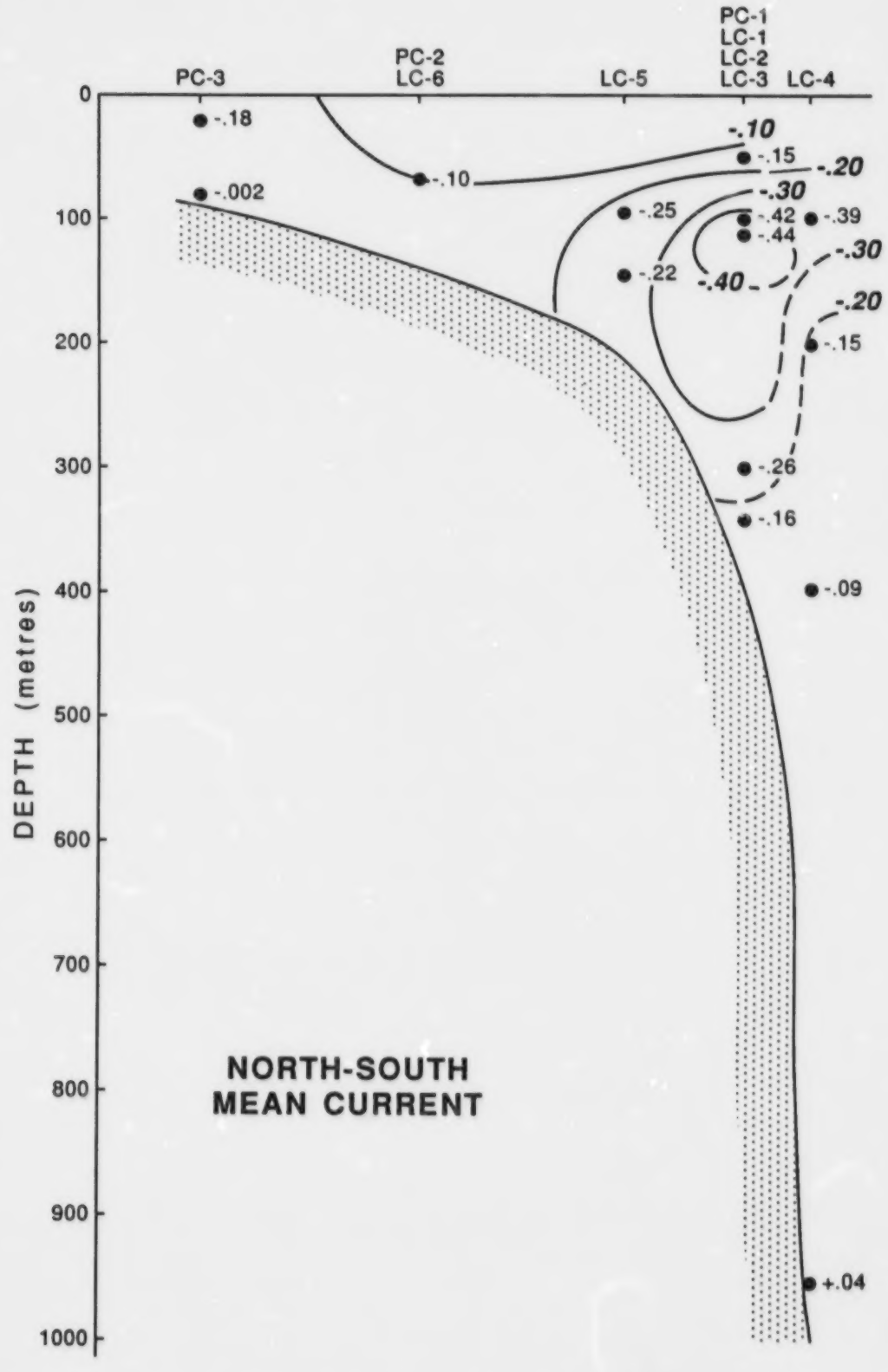

Figure 9. Cross-section of north-south mean currents. Contours east of the 400m isobath are broken as a reminder that the records from the 1000m isobath were only 2d long.

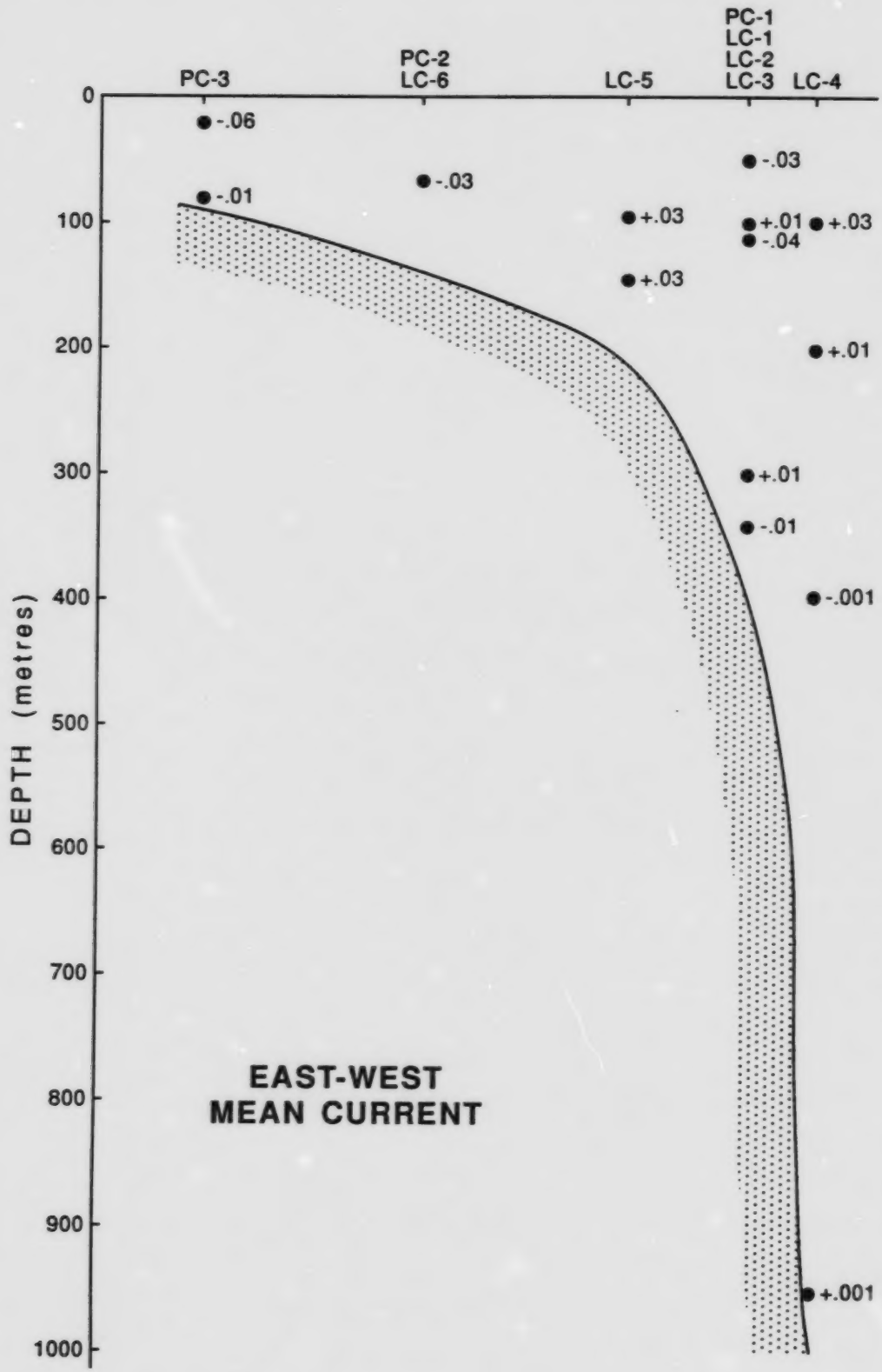

Figure 10. Cross-section of east-west mean currents.

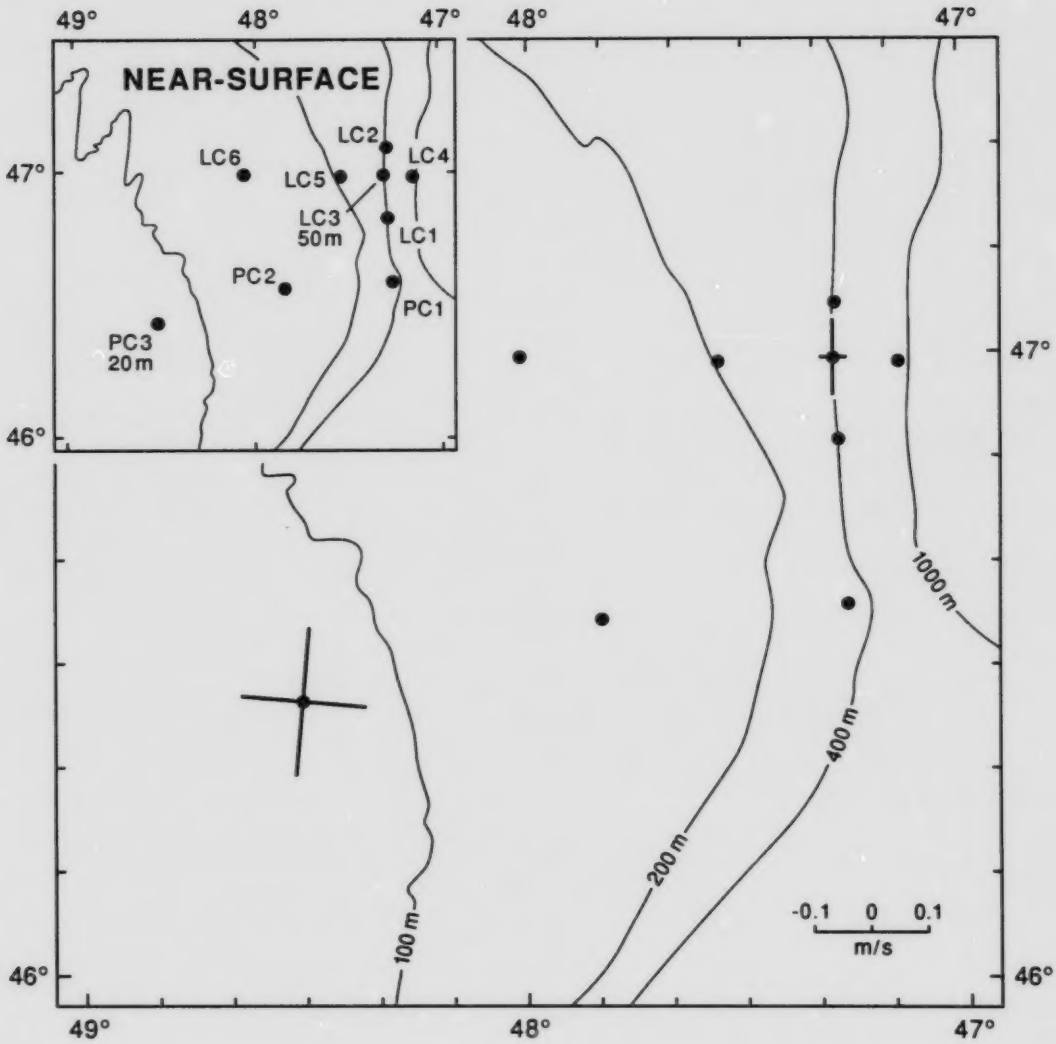

Figure 11. Plan view of near-surface standard deviations decomposed onto principal axes of variance and based on 20 minute data.

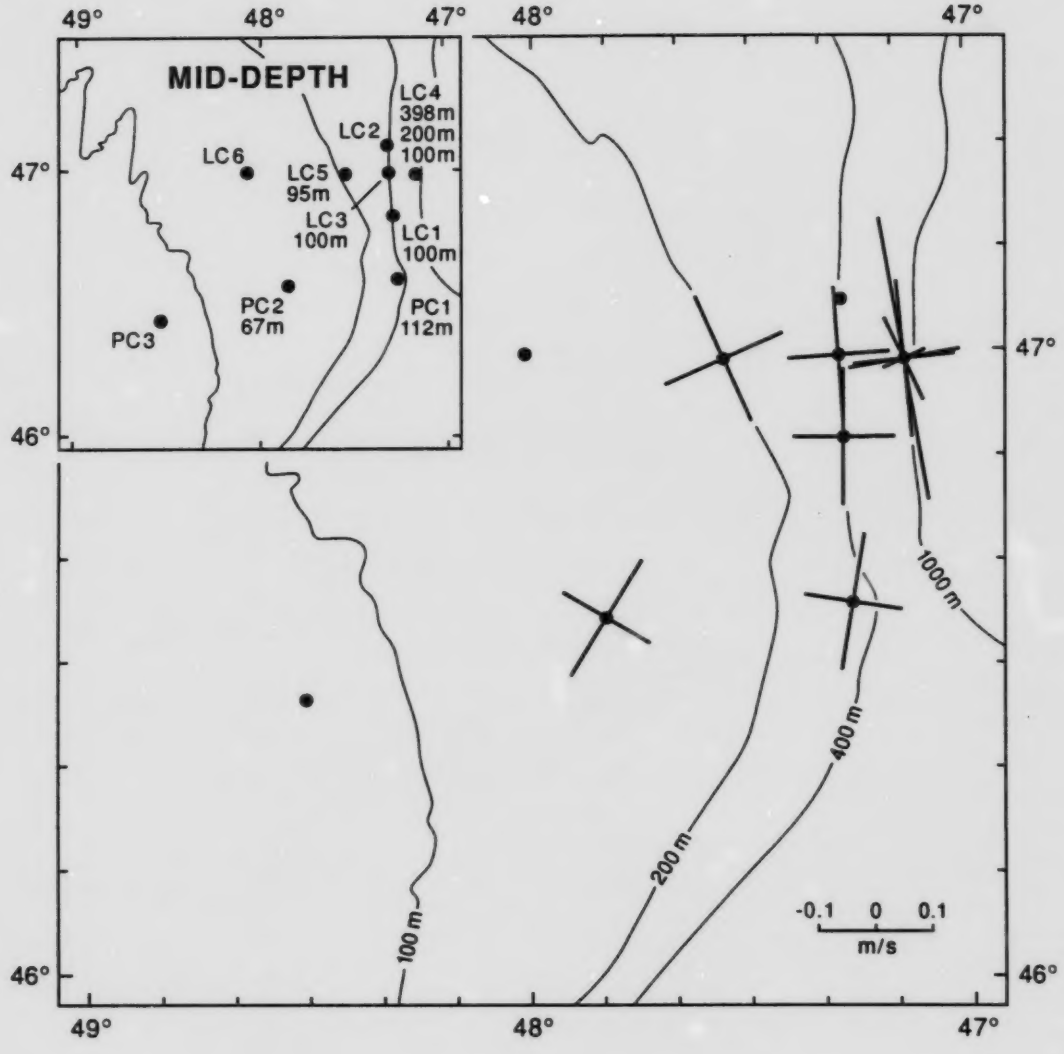

Figure 12. Plan view of mid-depth standard deviations decomposed onto principal axes of variance and based on 20 minute data.

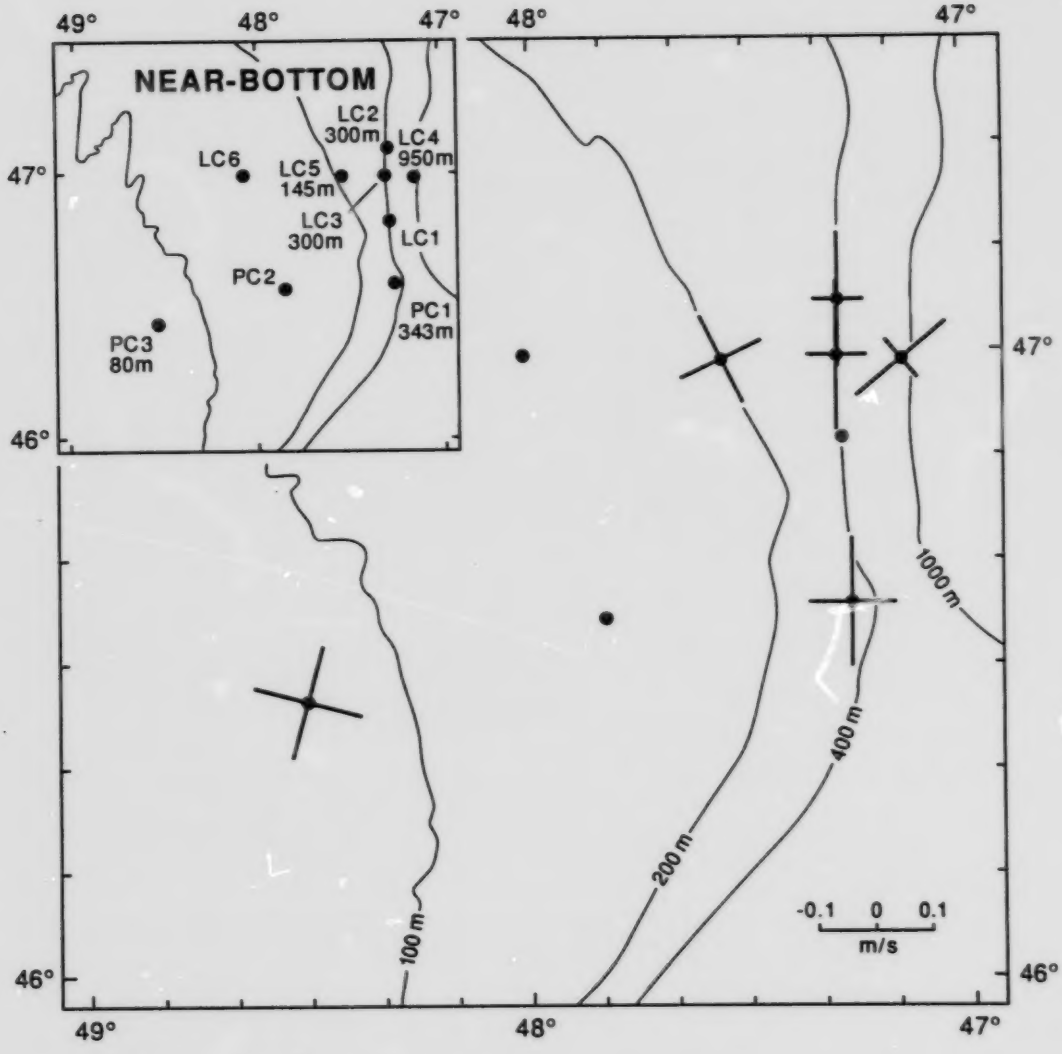

Figure 13. Plan view of near-bottom standard deviations decomposed onto principal axes of variance and based on 20 minute data.

TABLE 2

GENERAL TIDAL ANALYSIS FOR CURRENTS, TEMPERATURE, SALINITY, DENSITY ANOMALY

SITE (MOORING) (DEPTH)	CONSTITUENT	62.3 DAYS CENTERED AT DAY 329, 1985									
		CURRENT ELLIPSE				TEMPERATURE		SALINITY		DENSITY ANOMALY	
		MAJ. (M/S)	MIN. (M/S)	ORIEN. (DEG.T)	PHASE SENSE	AMP. (DEG.C.)	PHASE (GMT)	AMP. (PPT.)	PHASE (GMT)	AMP. (KG/M**3)	PHASE (GMT)
PC-1 (001,020M)	K1					.006	55				
	O1					.041	245				
	M2					.035	330				
	S2					.040	132				
	N2					.061	330				
	MF					.085	255				
	M4					.011	304				
	MS4					.017	292				
		99.1 DAYS CENTERED AT DAY 345, 1985									
PC-1 (001,112M)	K1	.021	.004	83	37/C	.023	18	.013	310	.010	302
	O1	.022	.002	93	284/C	.026	286	.011	189	.010	179
	M2	.013	.001	114	47/A	.023	15	.009	310	.007	301
	S2	.010	.002	327	261/A	.023	225	.006	299	.005	313
	N2	.005	.001	105	329/C	.014	80	.002	325	.002	308
	MF	.008	.001	2	360/C	.046	57	.018	182	.017	189
	M4	.002	.000	22	204/C	.010	176	.001	306	.002	323
	MS4	.001	.000	34	253/C	.017	27	.000	27	.001	192
		91.4 DAYS CENTERED AT DAY 341, 1985									
PC-1 (001,260M)	K1					.061	303	.004	298	.001	147
	O1					.062	185	.002	104	.004	20
	M2					.041	310	.026	313	.018	313
	S2					.009	356	.021	258	.017	256
	N2					.018	277	.008	216	.006	206
	MF					.163	11	.029	334	.016	311
	M4					.013	146	.014	3	.012	1
	MS4					.007	287	.003	249	.002	242

TABLE 2 - CONTINUED

SITE (MOORING) (DEPTH)	CONSTITUENT	99.1 DAYS CENTERED AT DAY 345, 1985									
		CURRENT ELLIPSE				TEMPERATURE		SALINITY		DENSITY ANOMALY	
		MAJ. (M/S)	MIN. (M/S)	ORIEN. (DEG.T)	PHASE SENSE	AMP. (DEG.C.)	PHASE (GMT)	AMP. (PPT.)	PHASE (GMT)	AMP. (KG/M**3)	PHASE (GMT)
PC-1 (001,343M)	K1	.021	.009	91	11/A	.090	267	.022	266	.010	264
	O1	.019	.007	57	290/A	.084	173	.020	175	.010	177
	M2	.024	.010	122	24/C	.068	260	.015	256	.006	252
	S2	.019	.003	328	251/C	.044	286	.010	279	.004	273
	N2	.004	.001	18	21/A	.015	229	.004	236	.002	237
	MF	.007	.000	28	0/A	.144	10	.033	11	.015	12
	M4	.001	.001	68	100/A	.004	319	.001	310	.001	303
	MS4	.002	.000	19	242/C	.006	159	.001	192	.001	218
		93.8 DAYS CENTERED AT DAY 342, 1985									
PC-2 (002,067M)	K1	.034	.024	78	41/C	.018	50	.007	341	.005	332
	O1	.036	.025	95	300/C	.047	213	.005	214	.002	211
	M2	.049	.024	101	56/C	.010	209	.004	53	.003	49
	S2	.028	.012	125	95/C	.018	355	.003	169	.003	170
	N2	.011	.007	79	45/C	.009	46	.001	67	.000	89
	MF	.008	.002	17	322/C	.085	215	.027	247	.019	252
	M4	.002	.000	329	69/C	.014	100	.000	194	.001	262
	MS4	.001	.000	84	124/A	.003	165	.001	198	.001	206
		62.3 DAYS CENTERED AT DAY 284, 1985*									
PC-3 (001,020M)	K1	.033	.027	355	39/A	.024	20[illegible]	.006	23	.008	20
	O1	.034	.027	0	297/A	.044	36	.006	266	.008	234
	M2	.062	.036	359	59/A	.015	202	.004	93	.004	55
	S2	.018	.006	326	80/A	.009	248	.004	64	.004	61
	N2	.018	.013	8	46/A	.007	337	.002	191	.003	178
	MF	.018	.004	83	321/A	.048	193	.043	326	.031	347
	M4	.002	.001	325	261/A	.004	193	.001	53	.001	33
	MS4	.001	.000	134	233/A	.003	301	.002	59	.002	60

*TEMPERATURE, SALINITY, DENSITY ANOMALY FOR PC-3(001,020M) 87.5 DAYS CENTERED AT DAY 296, 1985

TABLE 2 - CONTINUED

SITE (MOORING) (DEPTH)	CONSTITUENT	87.6 DAYS CENTERED AT DAY 296, 1985									
		CURRENT ELLIPSE				TEMPERATURE		SALINITY		DENSITY ANOMALY	
		MAJ. (M/S)	MIN. (M/S)	ORIEN. (DEG.T)	PHASE SENSE	AMP. (DEG.C.)	PHASE (GMT)	AMP. (PPT.)	PHASE (GMT)	AMP. (KG/M**3)	PHASE (GMT)
PC-3 (001,080M)	K1	.032	.022	68	48/C	.004	126	.002	347	.002	343
	O1	.025	.018	77	309/C	.010	24	.004	233	.003	230
	M2	.085	.049	111	48/C	.009	112	.002	282	.002	283
	S2	.033	.016	124	85/C	.008	114	.001	309	.001	306
	N2	.016	.012	131	60/C	.003	204	.001	271	.001	277
	MF	.009	.002	326	274/A	.025	246	.008	69	.008	69
	M4	.003	.002	107	334/C	.001	295	.002	240	.001	239
	MS4	.002	.002	343	320/C	.001	300	.002	140	.001	139
		97.5 DAYS CENTERED AT DAY 346, 1985									
LC-1 (710,050M)	K1					.024	139	.002	161	.001	223
	O1					.028	295	.001	130	.003	119
	M2					.036	181	.001	287	.003	342
	S2					.069	148	.007	209	.005	265
	N2					.023	244	.004	322	.003	353
	MF					.132	242	.026	238	.012	220
	M4					.019	67	.001	5	.001	295
	MS4					.012	159	.002	284	.002	314
		97.5 DAYS CENTERED AT DAY 346, 1985									
LC-1 (710,100M)	K1	.013	.000	93	14/C	.016	167	.002	197	.001	221
	O1	.015	.006	86	303/C	.046	121	.009	150	.005	169
	M2	.024	.005	94	71/C	.012	295	.008	284	.006	282
	S2	.010	.004	124	76/C	.042	174	.005	249	.005	288
	N2	.010	.004	99	53/C	.009	278	.004	268	.003	269
	MF	.007	.000	4	42/A	.088	286	.016	222	.012	195
	M4	.005	.002	39	270/C	.031	92	.002	125	.001	221
	MS4	.002	.001	92	154/C	.020	266	.001	258	.001	110

TABLE 2 - CONTINUED

SITE (MOORING) (DEPTH)	CONSTITUENT	97.5 DAYS CENTERED AT DAY 346, 1985									
		CURRENT ELLIPSE				TEMPERATURE		SALINITY		DENSITY ANOMALY	
		MAJ. (M/S)	MIN. (M/S)	ORIEN. (DEG.T)	PHASE SENSE	AMP. (DEG.C.)	PHASE (GMT)	AMP. (PPT.)	PHASE (GMT)	AMP. (KG/M**3)	PHASE (GMT)
LC-1 (710,300M)	K1					.029	277	.008	277	.005	277
	O1					.049	185	.013	179	.007	177
	M2					.039	291	.010	287	.005	285
	S2					.027	339	.005	334	.002	330
	N2					.011	85	.000	267	.001	264
	MF					.172	4	.041	8	.020	10
	M4					.004	260	.001	280	.000	294
	MS4					.004	137	.000	173	.000	239
		31.8 DAYS CENTERED AT DAY 315, 1985*									
LC-2 (711,300M)	K1	.006	.001	83	21/A	.018	321	.004	301	.002	286
	O1	.007	.002	103	287/A	.032	241	.006	230	.003	223
	M2	.026	.002	114	48/C	.045	261	.011	258	.005	257
	S2	.009	.002	130	72/C	.038	322	.008	326	.004	328
	N2	.008	.003	98	342/C	.026	258	.006	244	.003	235
	MF	.048	.003	3	55/C	.125	344	.026	346	.012	348
	M4	.002	.001	335	78/C	.004	172	.002	186	.001	194
	MS4	.003	.001	74	203/A	.008	276	.002	282	.001	288
		54.9 DAYS CENTERED AT DAY 326, 1985									
LC-3 (712,050M)	K1	.002	.001	65	266/A	.016	316	.009	345	.006	347
	O1	.001	.000	119	159/C	.141	277	.018	264	.005	234
	M2	.004	.002	11	72/C	.073	231	.018	251	.010	262
	S2	.002	.001	27	17/A	.024	209	.009	110	.008	94
	N2	.002	.001	74	103/C	.036	168	.009	145	.005	135
	MF	.016	.001	20	66/C	.140	207	.047	253	.029	265
	M4	.001	.000	332	334/C	.015	93	.003	222	.003	239
	MS4	.001	.000	27	186/C	.005	68	.004	135	.003	140

*TEMPERATURE, SALINITY, DENSITY ANOMALY FOR LC-2(711,300M) 96.5 DAYS CENTERED AT DAY 347, 1985

TABLE 2 - CONTINUED

SITE (MOORING) (DEPTH)	CONSTITUENT	98.9 DAYS CENTERED AT DAY 348, 1985									
		CURRENT ELLIPSE				TEMPERATURE		SALINITY		DENSITY ANOMALY	
		MAJ. (M/S)	MIN. (M/S)	ORIEN. (DEG.T)	PHASE SENSE	AMP. (DEG.C.)	PHASE (GMT)	AMP. (PPT.)	PHASE (GMT)	AMP. (KG/M**3)	PHASE (GMT)
LC-3 (712,100M)	K1	.006	.004	101	63/C	.030	351	.007	289	.005	270
	O1	.011	.004	78	249/C	.070	249	.010	192	.007	164
	M2	.028	.006	94	61/C	.082	356	.007	29	.003	90
	S2	.014	.009	322	265/C	.041	276	.005	297	.002	349
	N2	.011	.006	94	55/C	.018	180	.002	71	.002	41
	MF	.017	.006	355	60/A	.113	278	.012	159	.015	136
	M4	.002	.000	1	117/A	.009	71	.006	155	.004	160
	MS4	.002	.001	74	244/A	.016	159	.002	226	.002	257
		73.3 DAYS CENTERED AT DAY 335, 1985*									
LC-3 (712,300M)	K1	.007	.004	95	11/A	.040	268	.009	270	.004	272
	O1	.008	.002	50	292/A	.030	146	.007	161	.003	171
	M2	.020	.006	128	40/C	.044	272	.010	266	.005	262
	S2	.015	.004	322	276/C	.021	296	.005	297	.003	299
	N2	.007	.003	20	263/C	.012	202	.003	188	.001	182
	MF	.019	.003	354	1/C	.143	353	.034	357	.017	359
	M4	.002	.000	78	203/A	.005	101	.001	58	.001	40
	MS4	.003	.001	59	348/C	.008	2	.001	25	.000	55
		111.8 DAYS CENTERED AT DAY 339, 1985									
LC-5 (715,095M)	K1	.025	.013	81	24/C	.023	109	.005	318	.005	313
	O1	.022	.008	78	270/C	.037	212	.007	188	.004	173
	M2	.040	.006	94	52/C	.036	328	.006	20	.004	44
	S2	.016	.006	107	77/C	.009	296	.001	358	.001	25
	N2	.012	.005	74	19/C	.010	238	.004	326	.003	332
	MF	.014	.001	11	305/A	.157	176	.034	169	.019	164
	M4	.002	.001	102	24/C	.006	341	.002	15	.001	3
	MS4	.002	.001	117	217/C	.003	210	.002	204	.001	204

*TEMPERATURE, SALINITY, DENSITY ANOMALY FOR LC-3(712,300M) 98.9 DAYS CENTERED AT DAY 348, 1985

MOORING PC-1
DEPTH (M) 20

INSTRUMENT TYPE	N BROWN ACM2
SERIAL NUMBER	1194
LATITUDE	46 35.91 N
LONGITUDE	47 15.92 W
WATER DEPTH (M)	400
MOORING DATE ; CRUISE	25/10/1985 ; 85-930
DURATION (DAYS)	70.53
SAMPLE INTERVAL	20 MINUTES

SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
TEMPERATURE (DEG.C)	1.456	-.624	6.284	1.333	5078
PRESSURE(DBAR)	21.990	11.520	50.973	6.334	5078

COMMENTS
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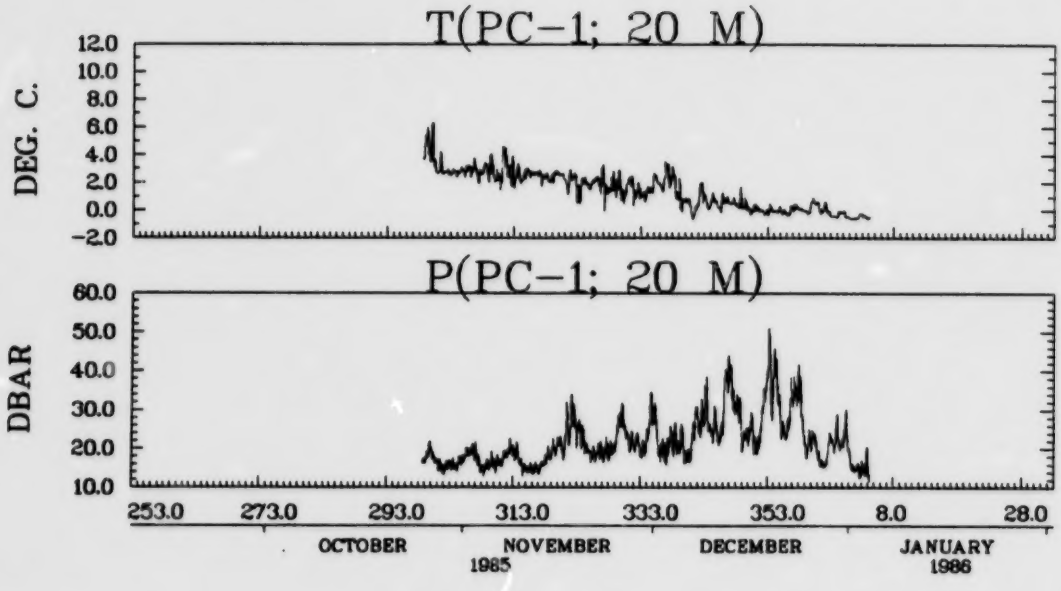
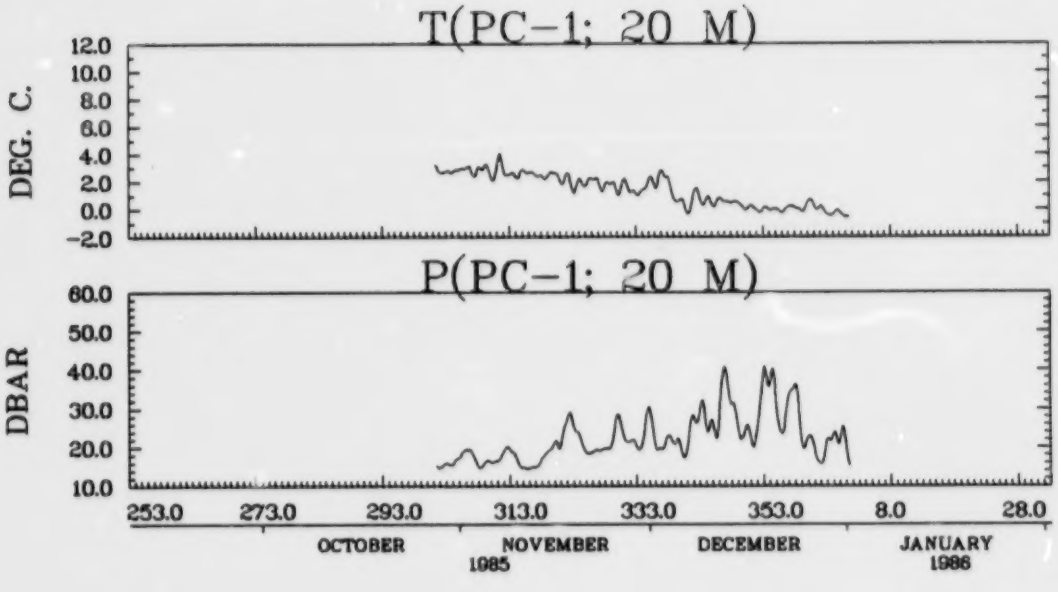
6 HOUR: PRESSURE TEMPERATURE

MEAN	22.440	1.430
STD DEV	6.074	1.163

SPEED DIRECTION AND CONDUCTIVITY FAILED FROM THE BEGINNING OF RECORD. PRESSURE AND TEMPERATURE FAILED BY DAY 4, 1986.
DATA FILTERED TO 20 MINUTE INTERVALS FROM 2 MINUTE INTERVALS USING BOXCAR FILTER WITH DECIMATION RATIO OF 10 AND NUMBER OF WEIGHTS EQUAL 11.



LCVS STATION PC-1 DEPTH 20 M.



LCVS STATION PC-1 DEPTH 20 M.

MOORING PC-1
DEPTH (M) 112

INSTRUMENT TYPE	AANDERAA RCM4
SERIAL NUMBER	3688
LATITUDE	46 35.91 N
LONGITUDE	47 15.92 W
WATER DEPTH (M)	400
MOORING DATE ; CRUISE	23/10/1985 ; 85-930
DURATION (DAYS)	99.14
SAMPLE INTERVAL	20 MINUTES

SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
SPEED(M/SEC.)	.446	.138	.865	.119	7138
E COMP VEL(M/S)	-.039	-.440	.296	.085	7138
N COMP VEL(M/S)	-.436	-.825	-.134	.118	7138
TEMPERATURE(DEG.C.)	.388	-.905	3.709	.802	7138
SALINITY	33.445	32.985	34.162	.155	7138
PRESSURE(DBAR)	112.154	105.000	142.200	5.745	7138
SIGMA-T(KG/M**3)	26.827	26.465	27.272	.099	7138

COMMENTS
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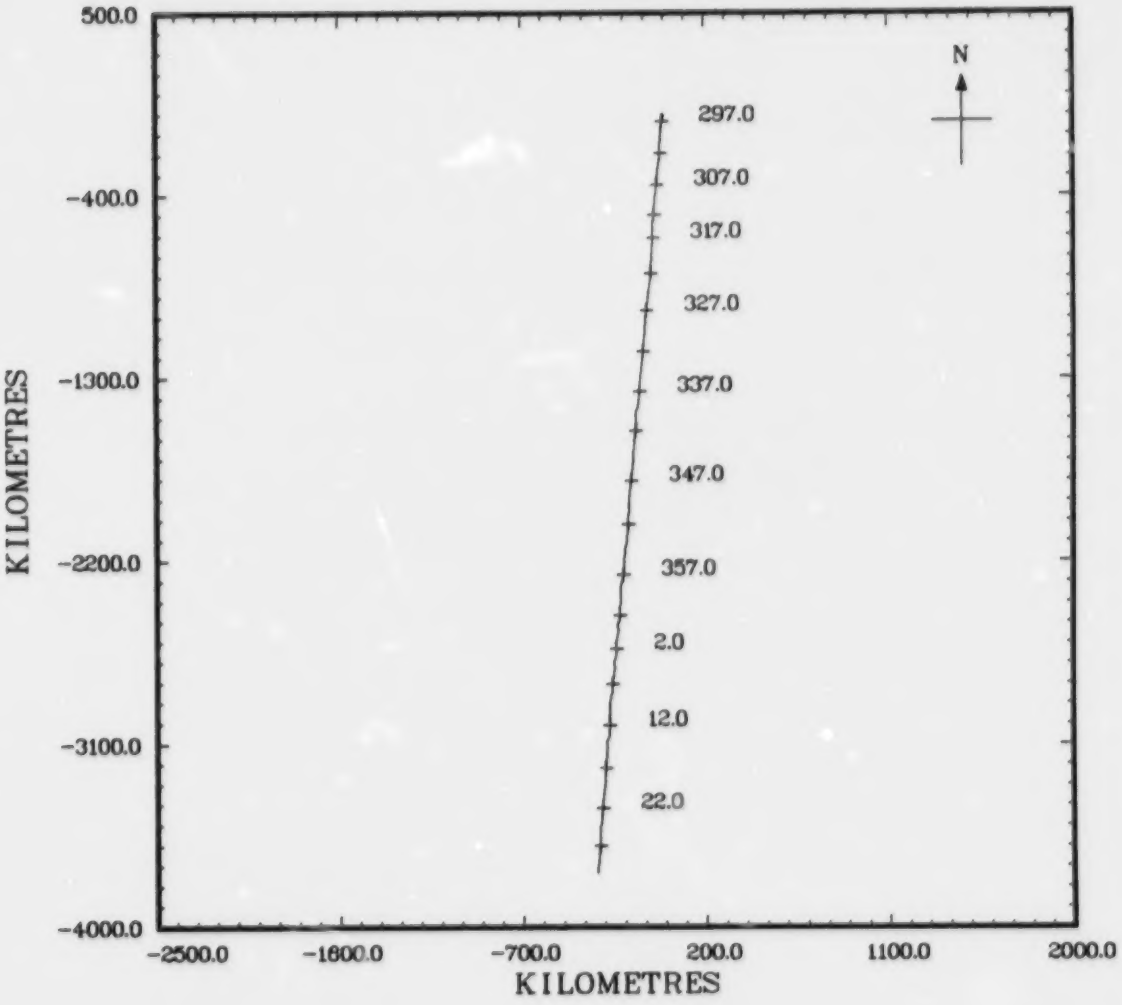
6 HOUR:	SPEED	E VEL	N VEL	PRESSURE	TEMPERATURE	SALINITY	SIGMA-T
MEAN	.439	-.039	-.436	112.211	.430	33.454	26.832
STD DEV	.105	.042	.104	5.301	.680	.136	.085

PC-1 112 M.



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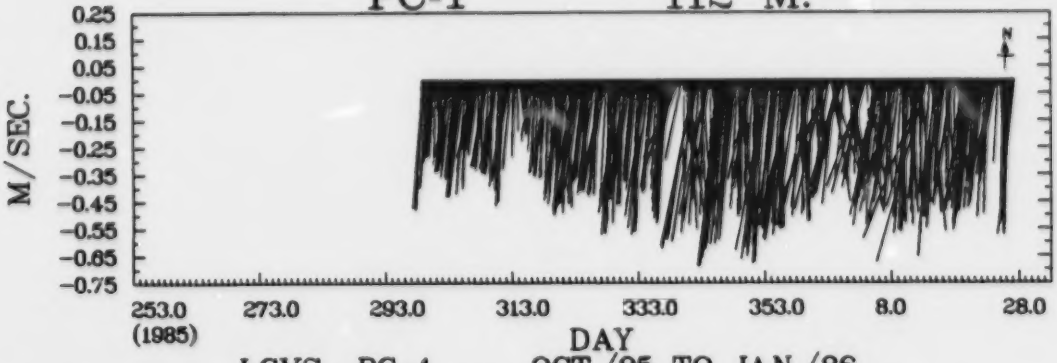
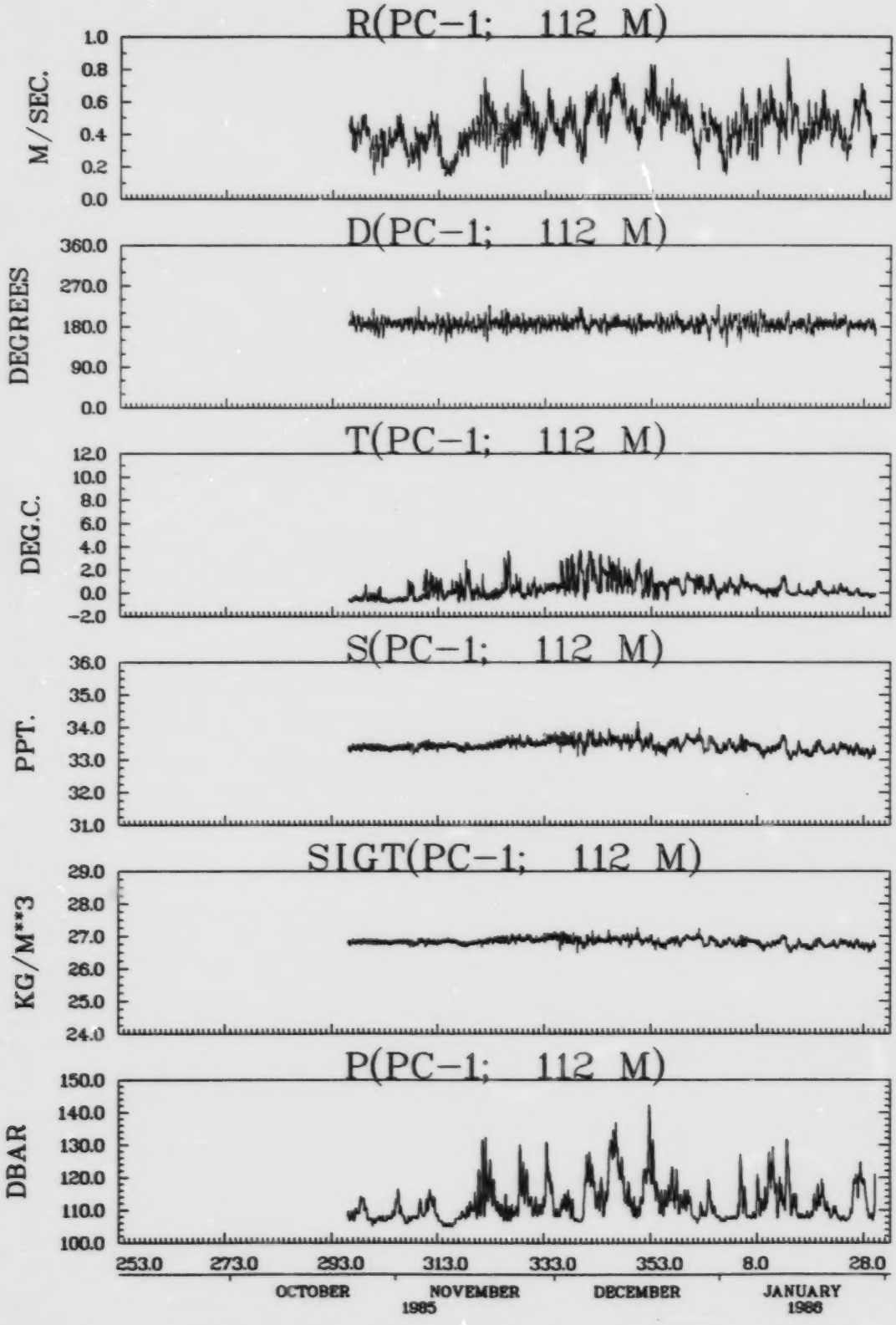


LCVS PC-1 OCT./85 TO JAN./86



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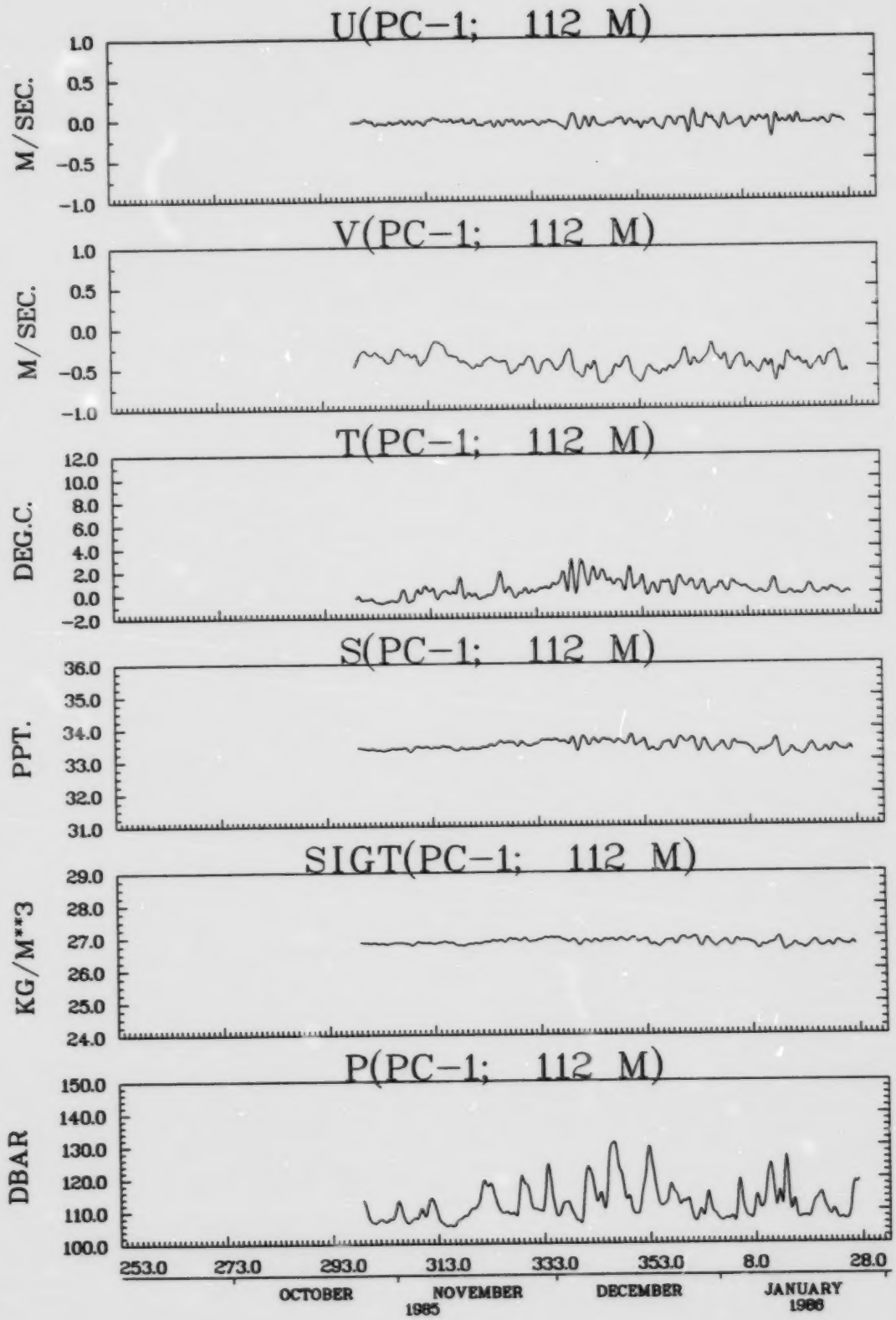

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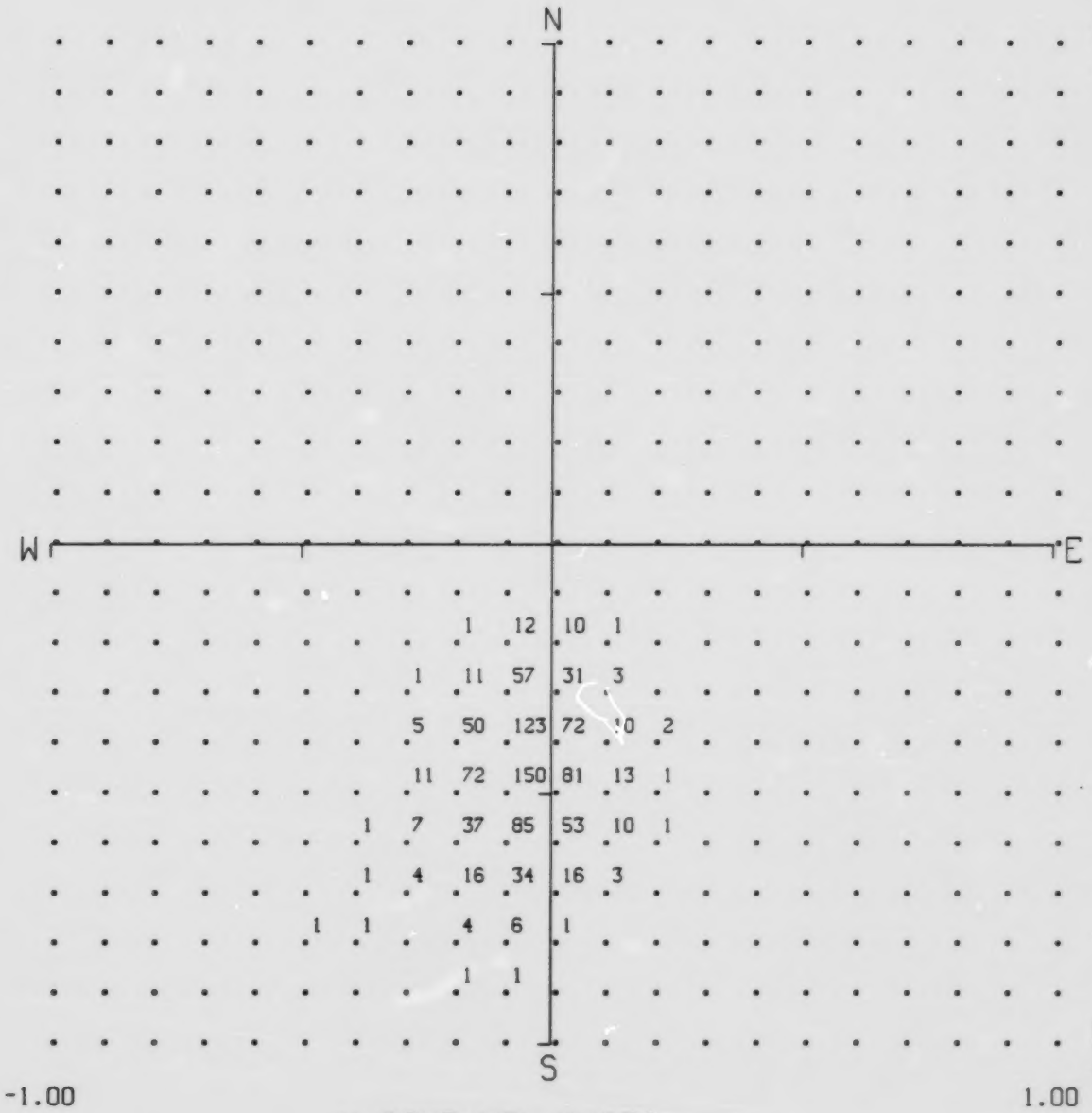

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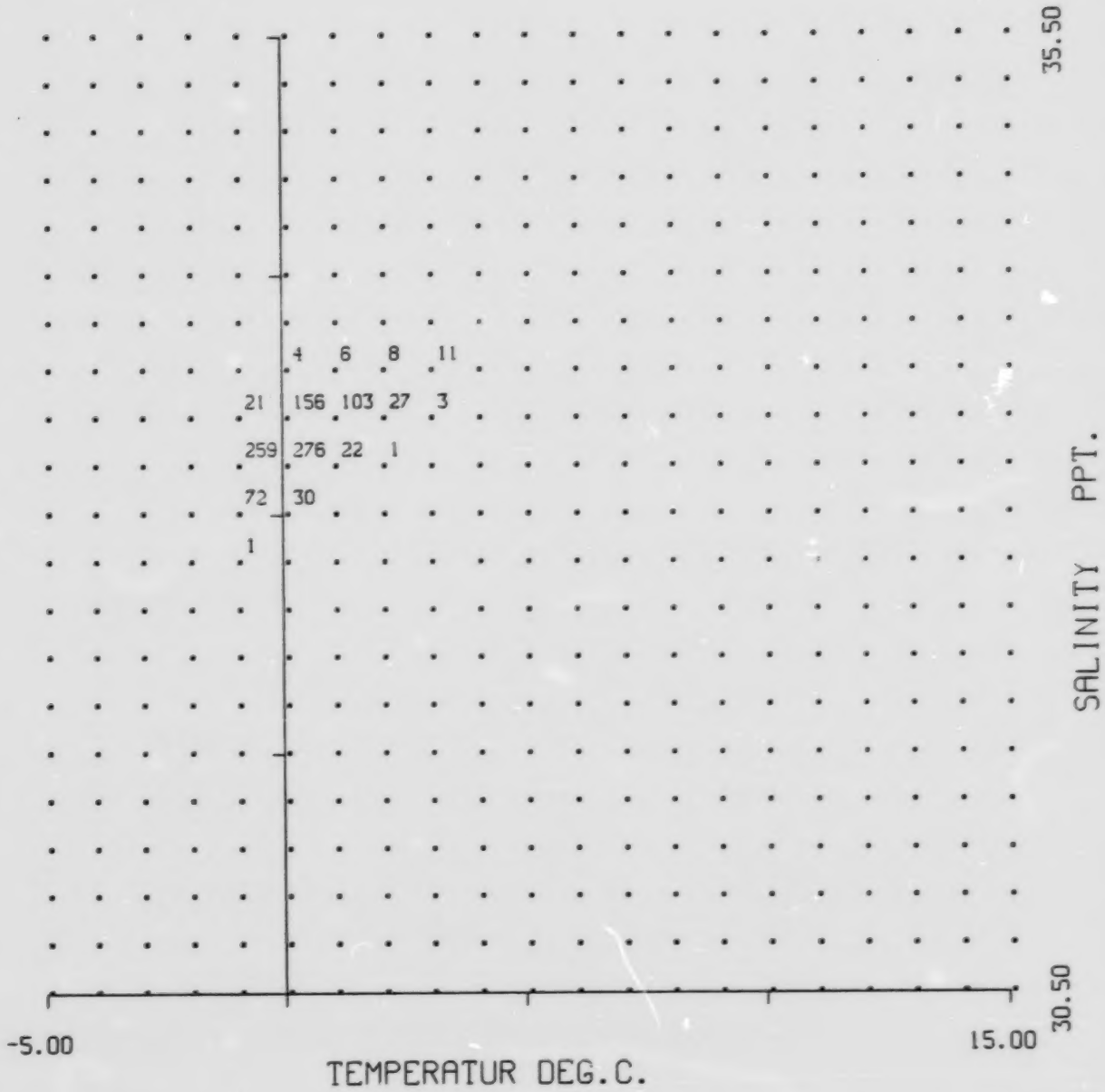

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MOORING PC-1
DEPTH (M) 260

INSTRUMENT TYPE	ANDERAA RCM4
SERIAL NUMBER	3679
LATITUDE	46 35.91 N
LONGITUDE	47 15.92 W
WATER DEPTH (M)	400
MOORING DATE ; CRUISE	23/10/1985 ; 85-930
DURATION (DAYS)	91.40
SAMPLE INTERVAL	20 MINUTES

SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
SPEED(M/SEC.)	.333	.015	.697	.120	6581
TEMPERATURE(DEG.C.)	1.225	-.324	2.644	.493	6581
SALINITY	34.[illegible]2	32.512	35.035	.311	6581
SIGMA-T(KG/M**3)	27.308	25.930	28.064	.252	6581

COMMENTS
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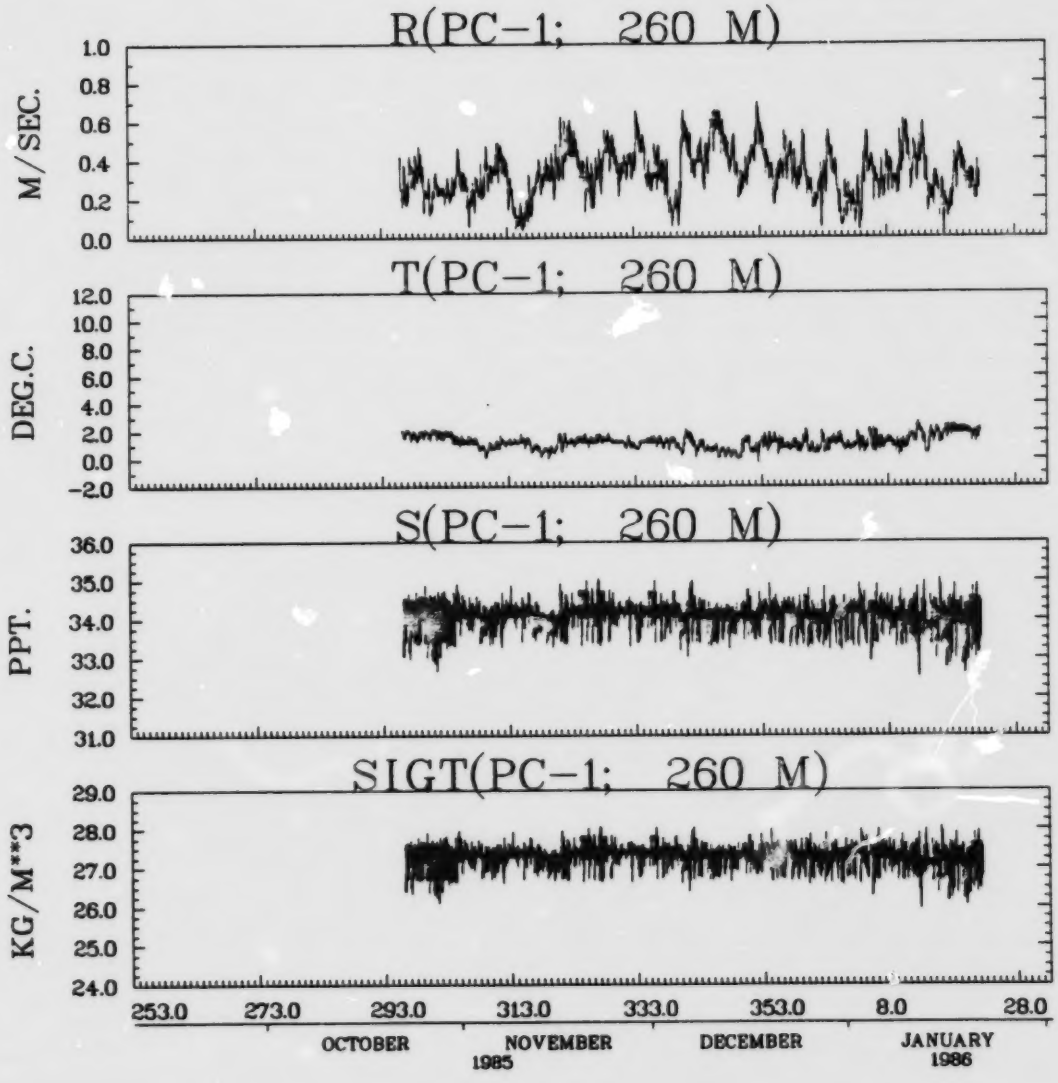
6 HOUR:	TEMPERATURE	SALINITY	SIGMA-T
MEAN	1.187	34.104	27.312
STD DEV	.422	.132	.104

DIRECTION MALFUNCTIONED FROM BEGINNING OF RECORD.
ALL SENSORS FAILED AFTER DAY 22 1986.



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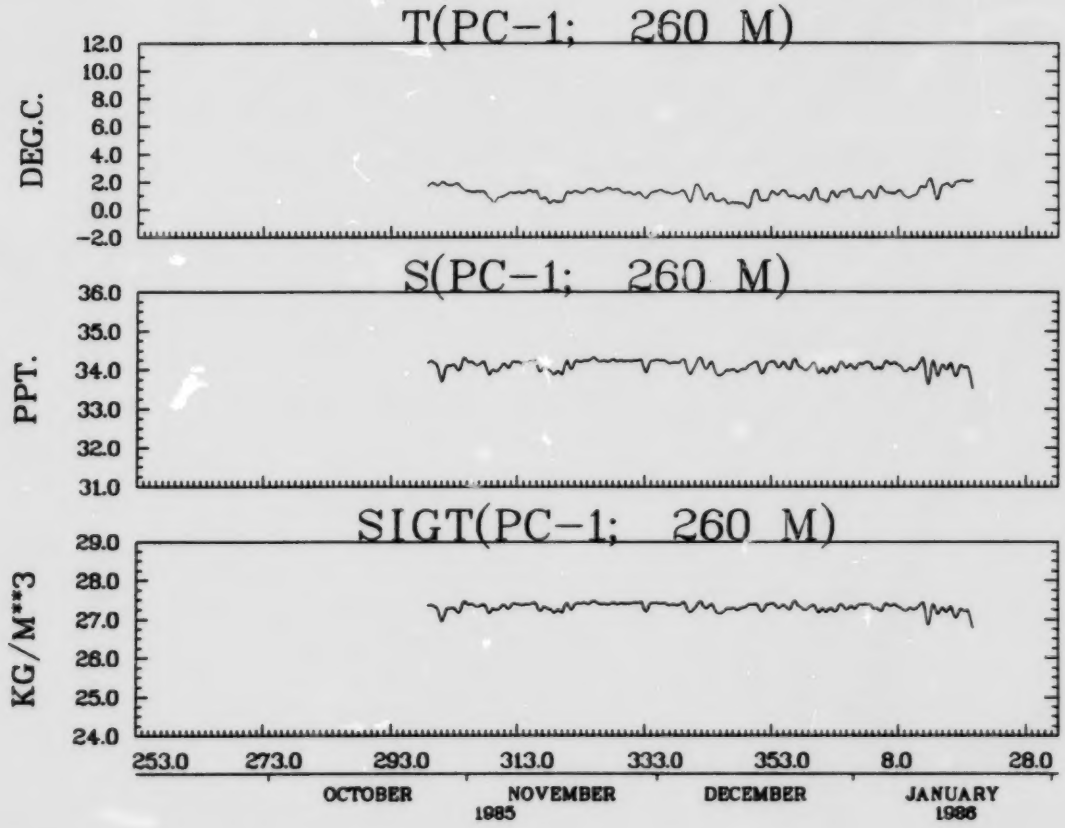

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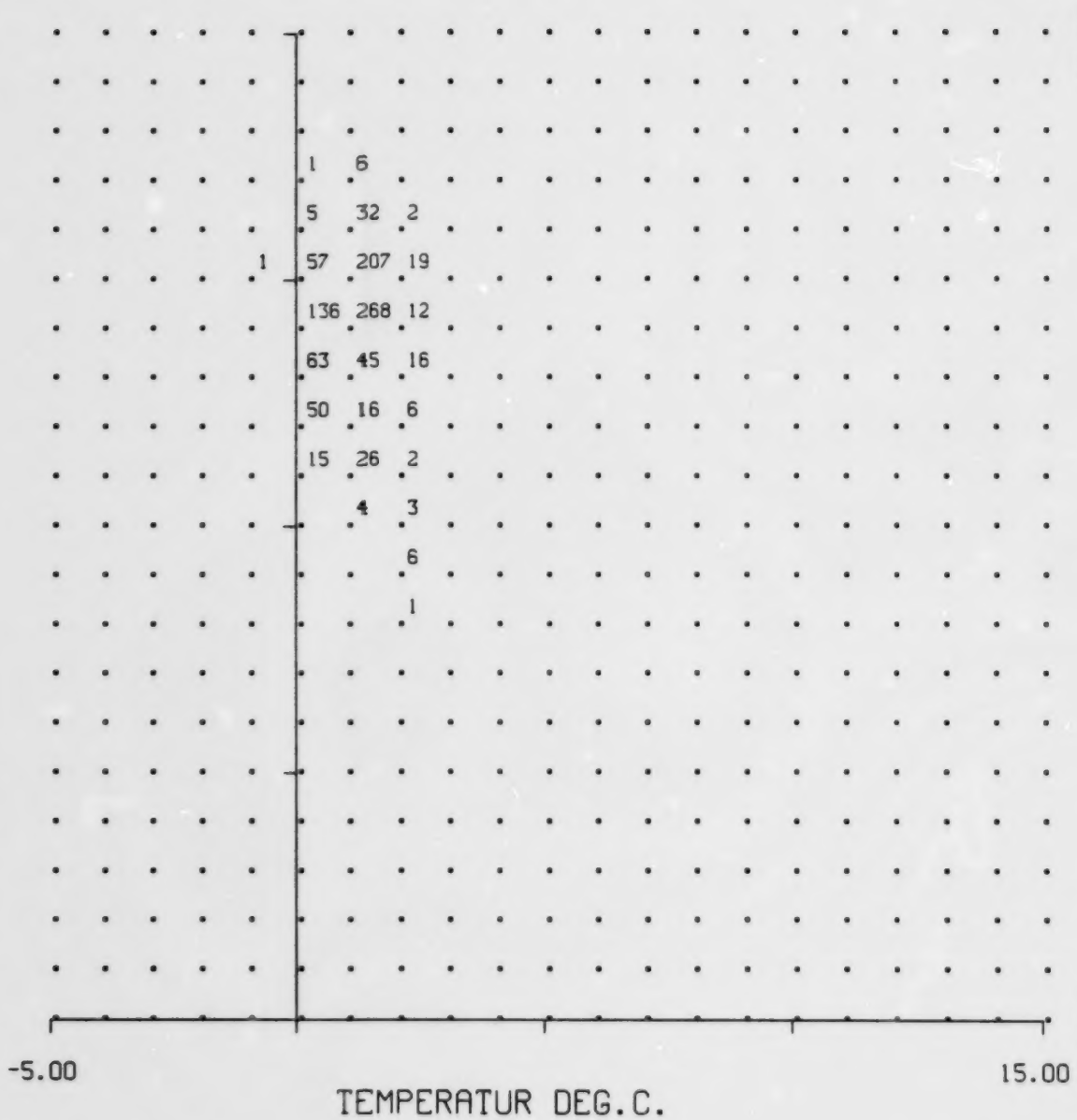

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LCVS STATION PC-1 DEPTH 260 M.
START TIME 23/10/1985 1:20: .0 GMT
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MOORING PC-1
DEPTH (M) 343

INSTRUMENT TYPE	AANDERAA RCM4
SERIAL NUMBER	3705
LATITUDE	46 35.91 N
LONGITUDE	47 15.92 W
WATER DEPTH (M)	400
MOORING DATE ; CRUISE	23/10/1985 ; 85-930
DURATION (DAYS)	99.14
SAMPLE INTERVAL	20 MINUTES

SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
SPEED(M/SEC.)	.187	.015	.526	.091	7138
E COMP VEL(M/S)	-.010	-.274	.319	.069	7138
N COMP VEL(M/S)	-.163	-.516	.206	.109	7138
TEMPERATURE(DEG.C.)	2.088	.577	3.569	.515	7138
SALINITY	34.363	33.945	34.724	.117	7138
PRESSURE(DBAR)	342.563	337.400	347.300	2.073	7138
SIGMA-T(KG/M**3)	27.454	27.116	27.656	.058	7138

COMMENTS
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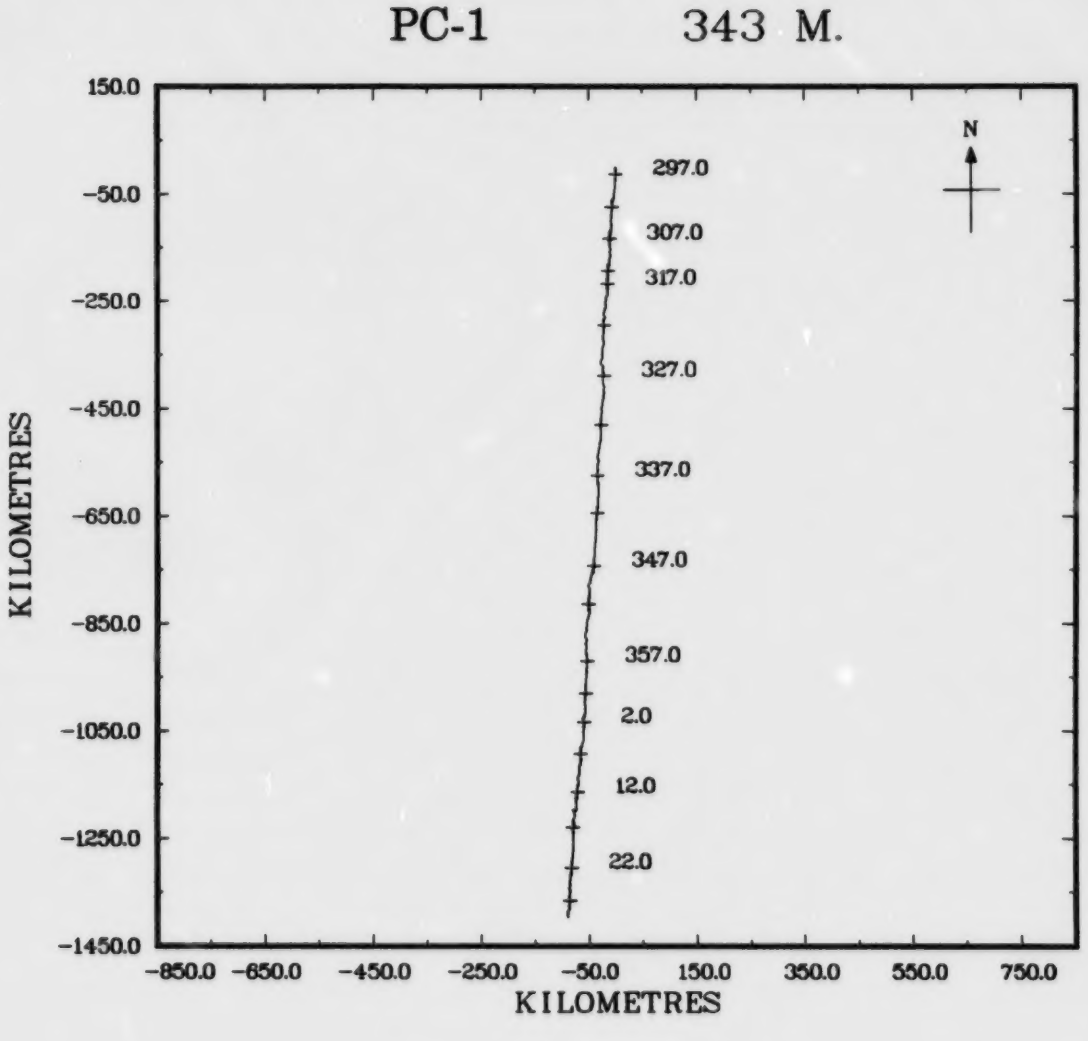
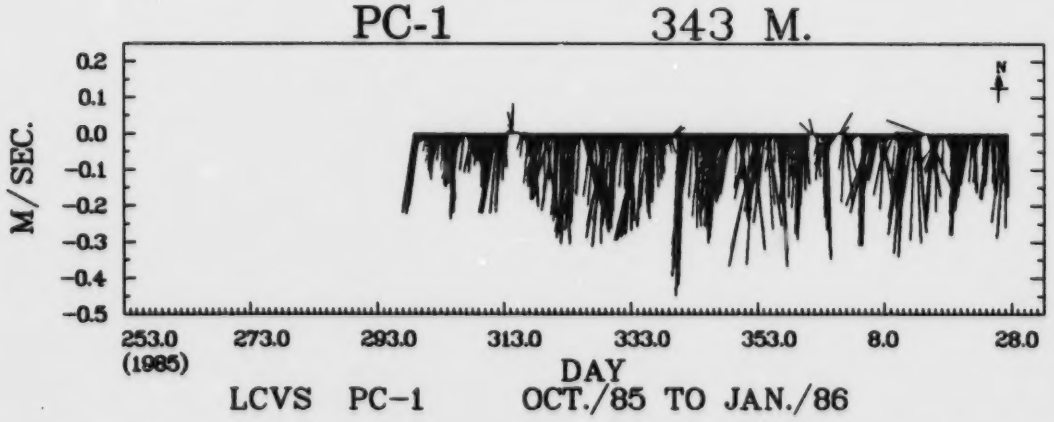
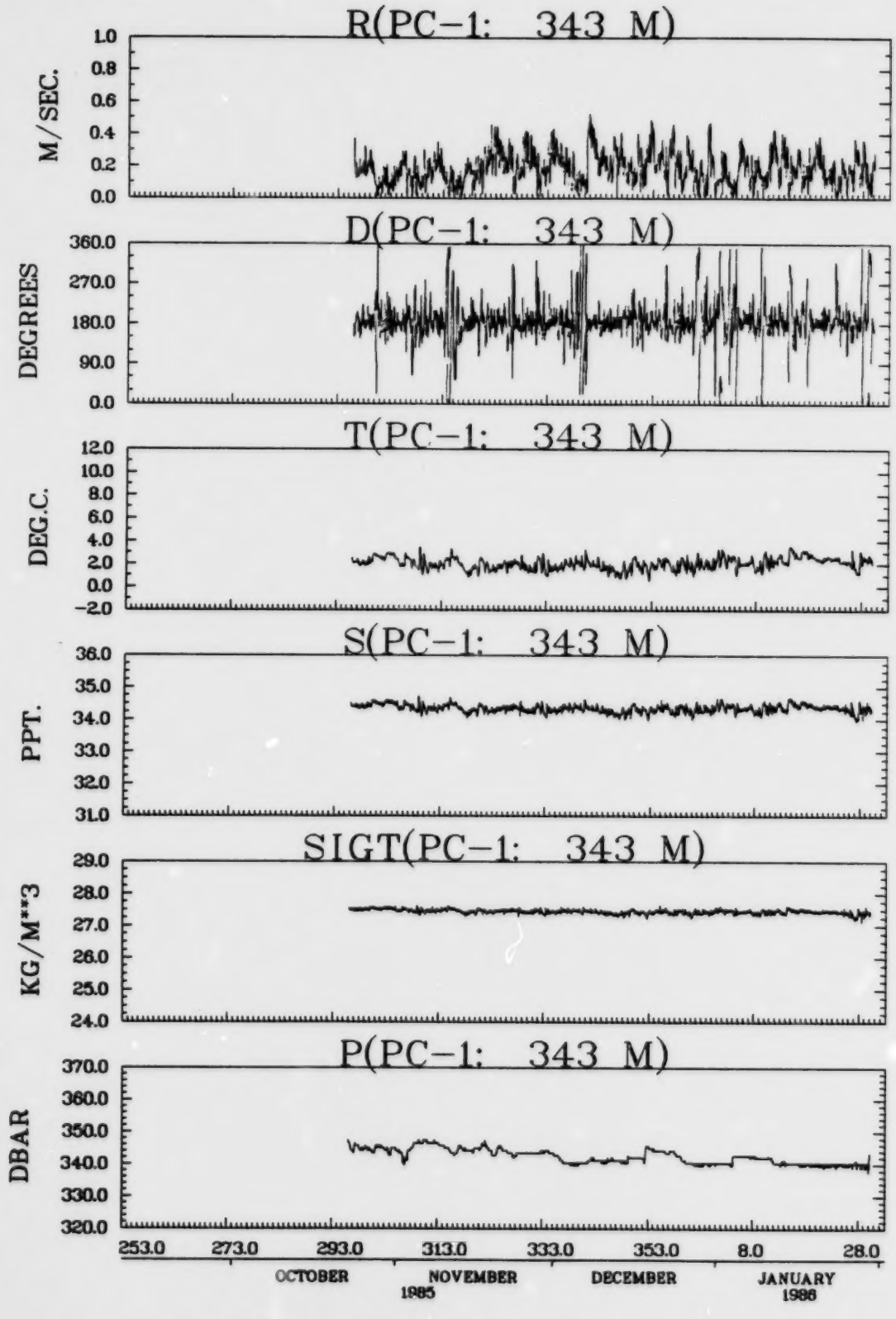
6 HOUR:	SPEED	E VEL	N VEL	PRESSURE	TEMPERATURE	SALINITY	SIGMA-T
MEAN	.170	-.011	-.165	342.552	2.079	34.362	27.454
STD DEV	.085	.023	.091	2.025	.440	.095	.044





LCVS PC-1 OCT./85 TO JAN./86



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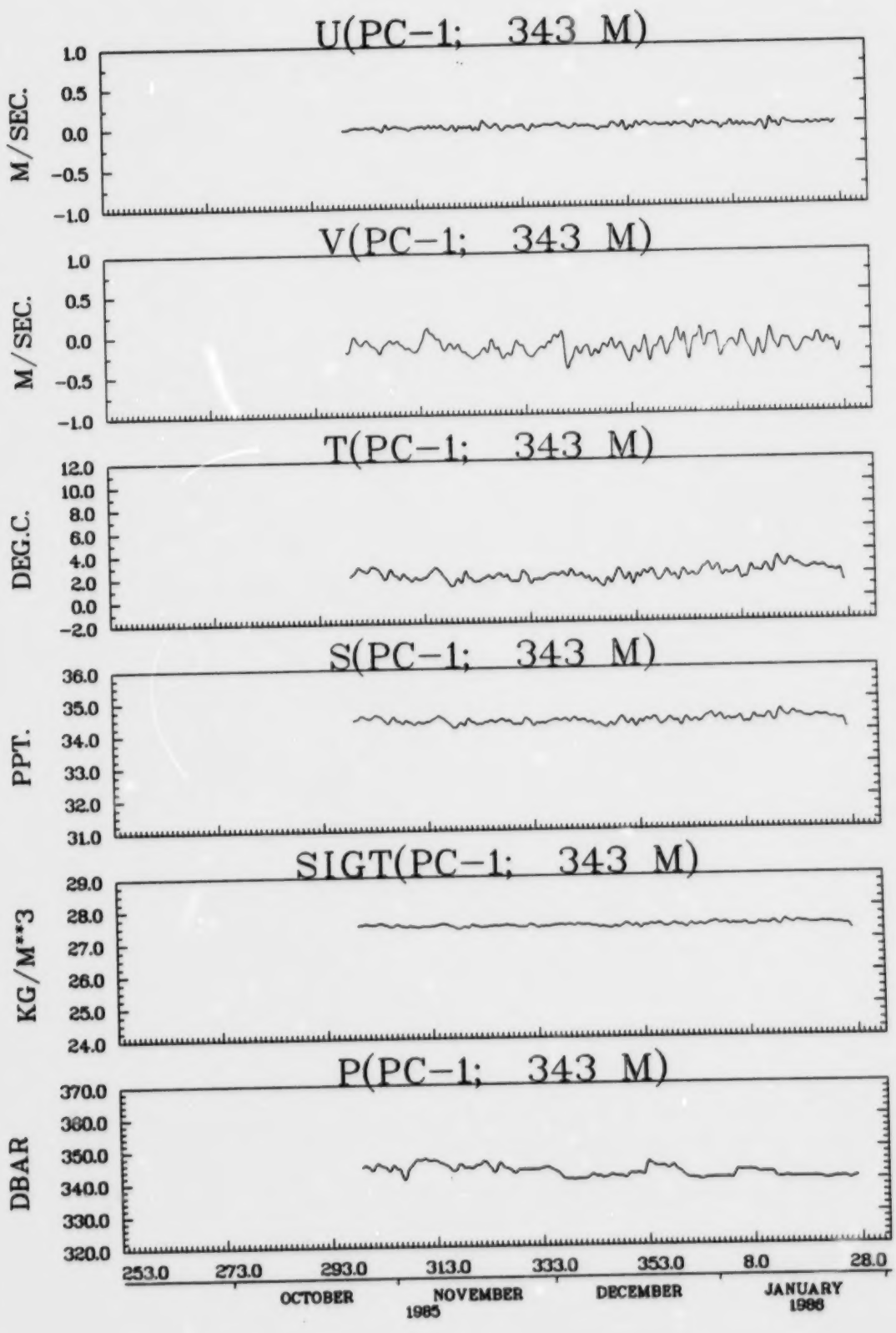

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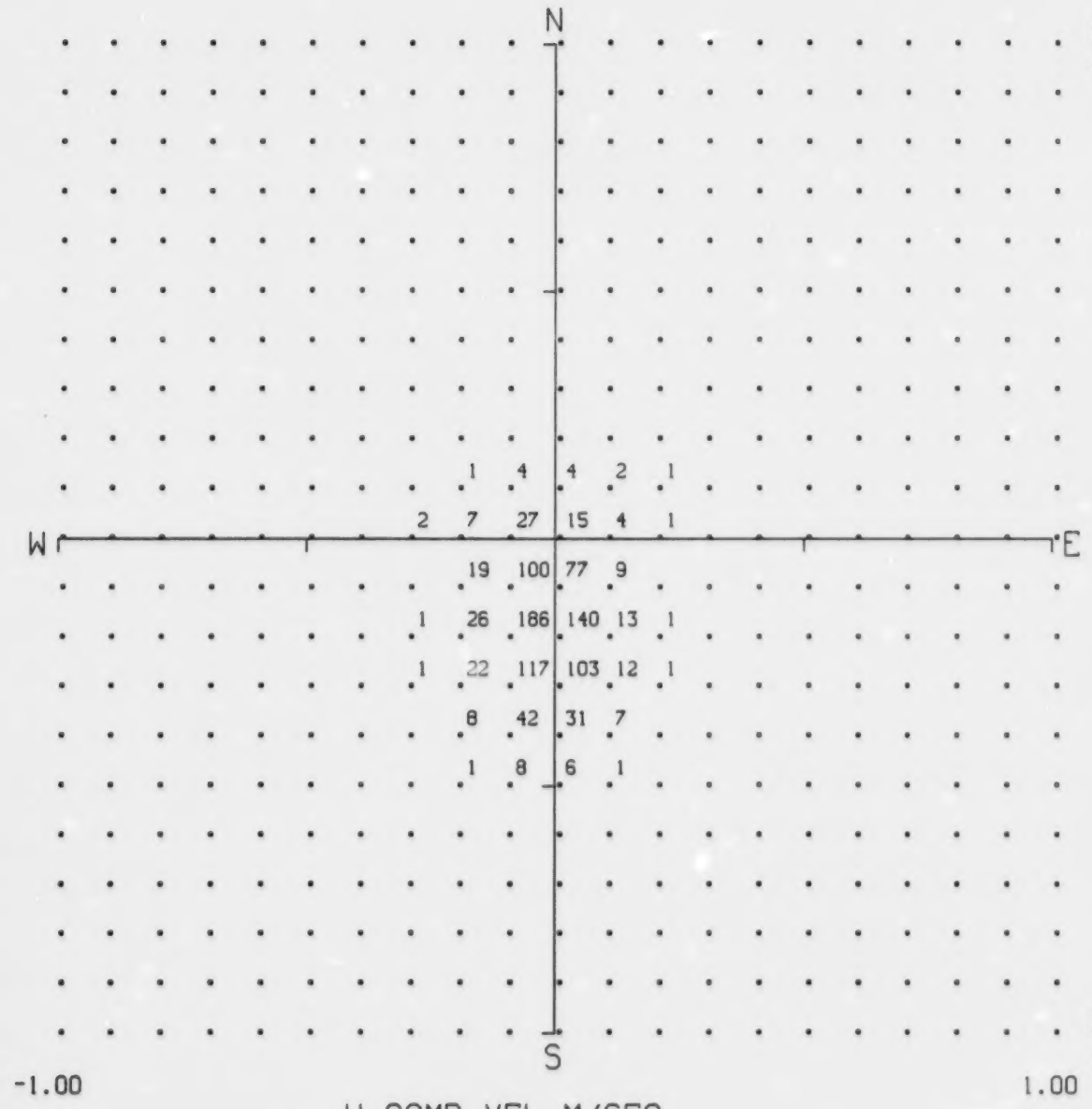

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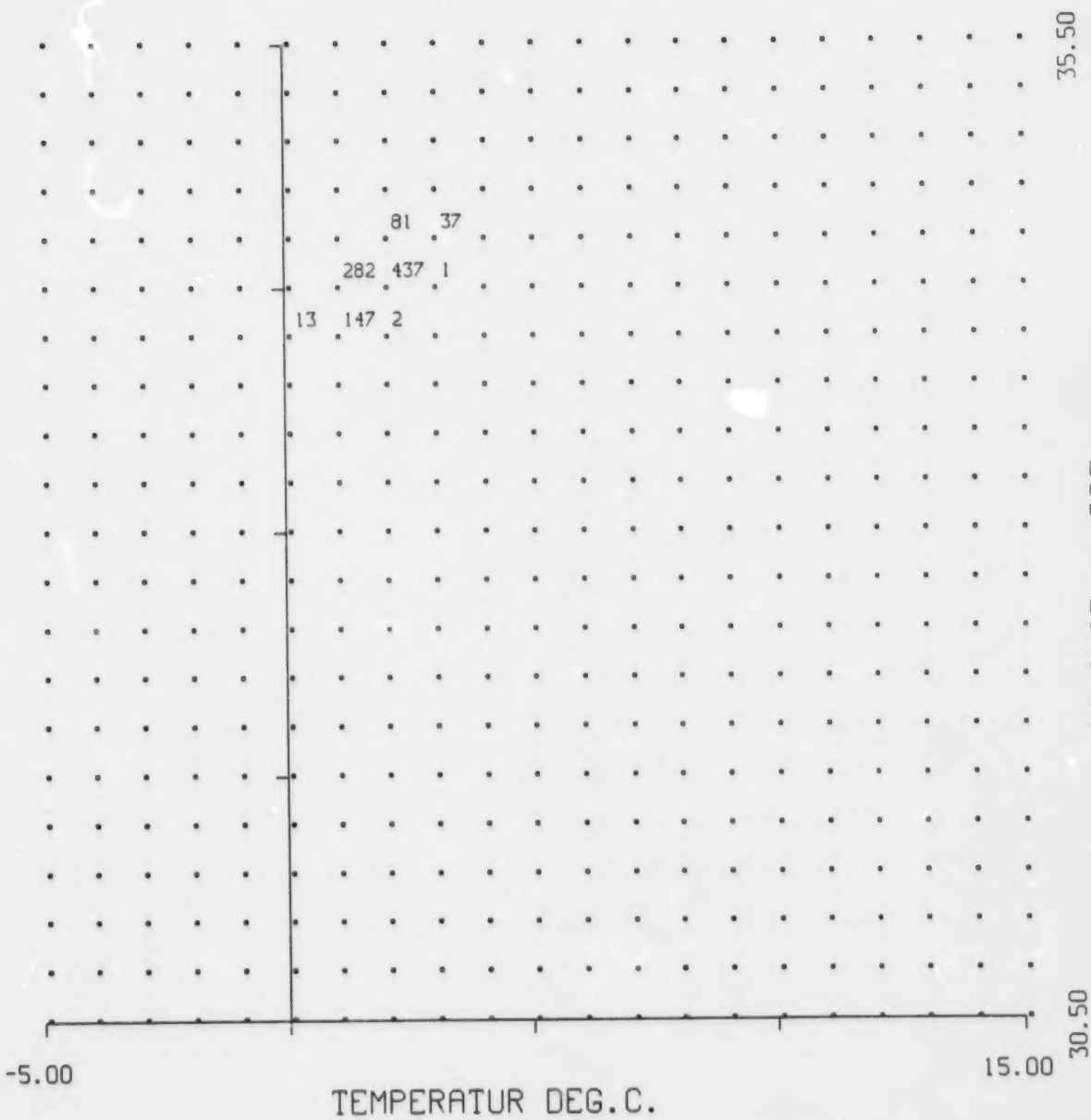


FREQUENCY DISTRIBUTION PLOT
LCVS STATION PC-1 DEPTH 343 M.
START TIME 23/10/1985 1:20: .0 GMT
FREQUENCY UNIT 0.1%

MOORING PC-2
DEPTH (M) 20

INSTRUMENT	N BROWN ACM2
SERIAL NUMBER	1190
LATITUDE	46 34.80 N
LONGITUDE	47 49.90 W
WATER DEPTH (M)	140
MOORING DATE;CRUISE	22/10/1985 ; 85-930
DURATION (DAYS)	0.0
SAMPLE INTERVAL	20 MINUTES

COMMENTS

INSTRUMENT WAS NOT RECOVERED, SERIAL NUMBER IS QUESTIONABLE AND CANNOT BE VERIFIED.

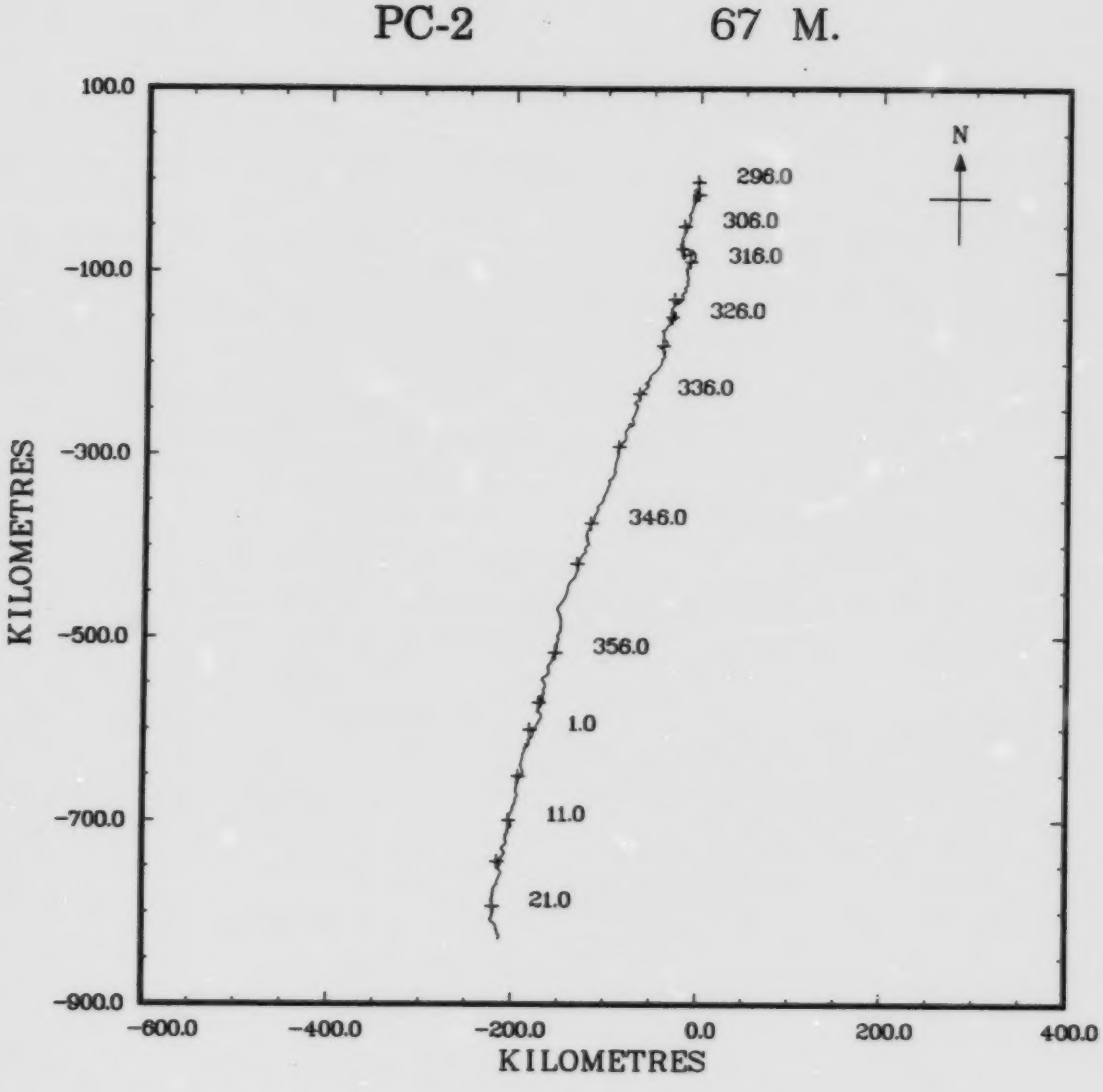
MOORING PC-2
DEPTH (M) 67

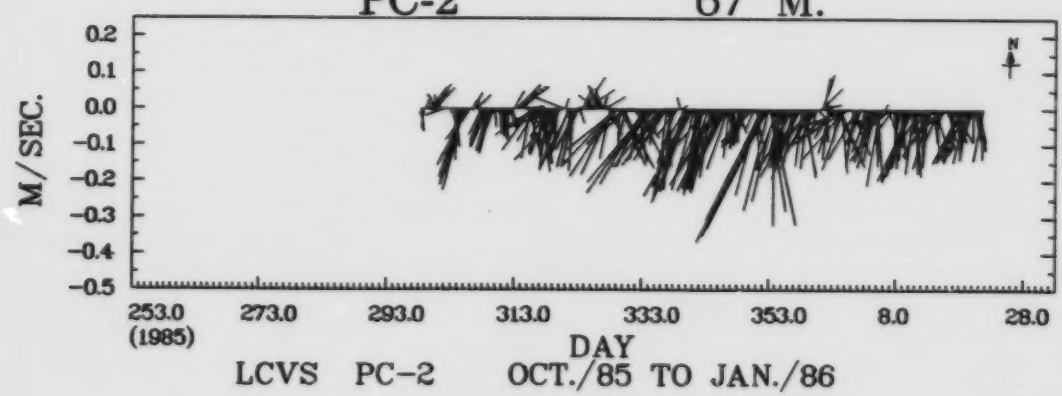
INSTRUMENT TYPE	AANDERAA RCM4
SERIAL NUMBER	3669
LATITUDE	46 34.60 N
LONGITUDE	47 48.90 W
WATER DEPTH (M)	140
MOORING DATE ; CRUISE	22/10/1985 ; 85-930
DURATION (DAYS)	93.79
SAMPLE INTERVAL	20 MINUTES

SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
SPEED(M/SEC.)	.157	.015	.515	.076	6753
E COMP VEL(M/S)	-.026	-.377	.322	.093	6753
N COMP VEL(M/S)	-.102	-.488	.235	.102	6753
TEMPERATURE(DEG.C.)	-.302	-1.629	2.570	.730	6753
SALINITY	33.082	32.558	33.750	.148	6753
PRESSURE(DBAR)	66.943	63.000	72.800	1.883	6753
SIGMA-T(KG/M**3)	26.569	26.076	27.076	.121	6753

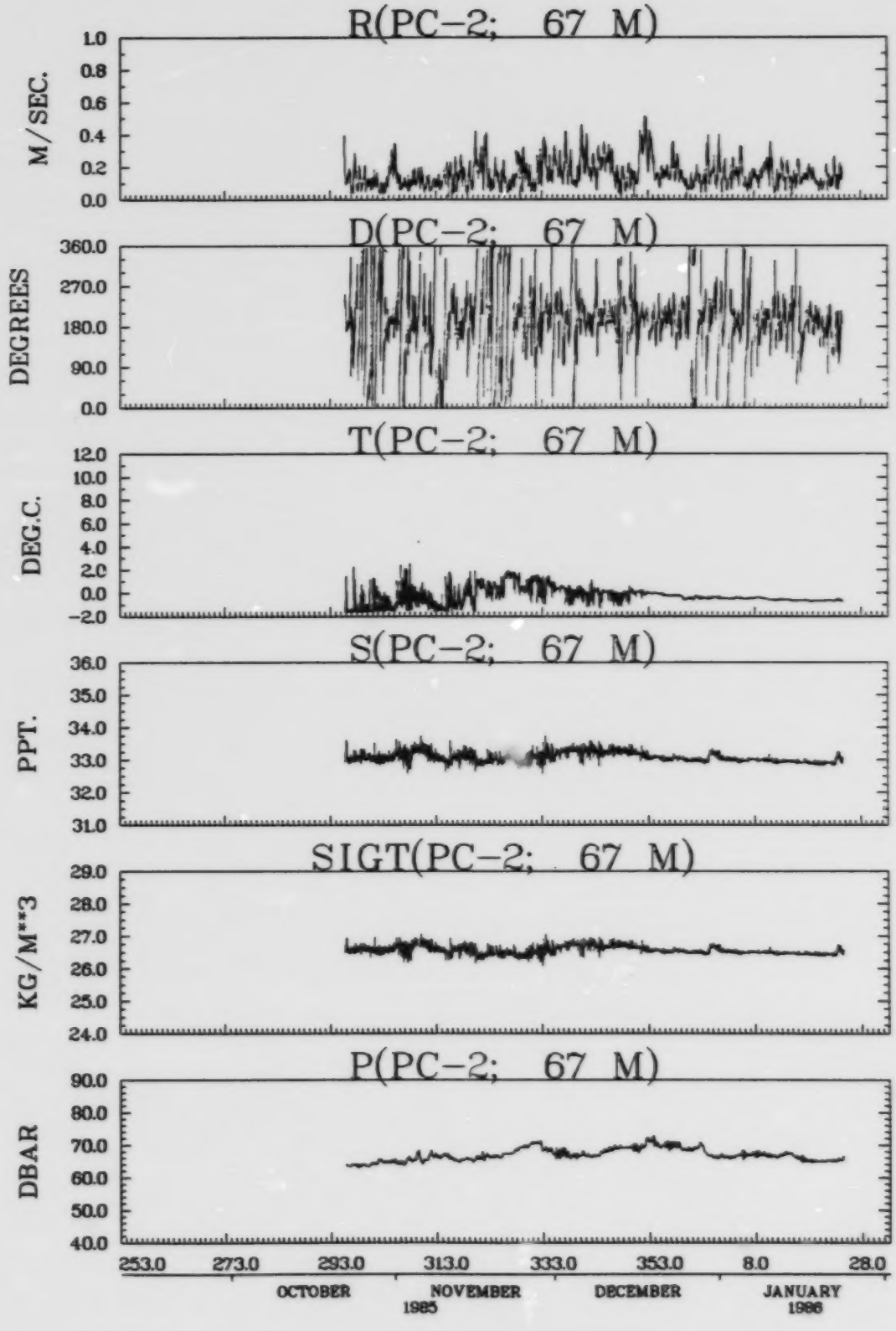
COMMENTS
---

6 HOUR:	SPEED	E VEL	N VEL	PRESSURE	TEMPERATURE	SALINITY	SIGMA-T
MEAN	.126	-.028	-.102	67.086	-.260	33.087	26.570
STD DEV	.069	.051	.083	1.797	.625	.129	.105

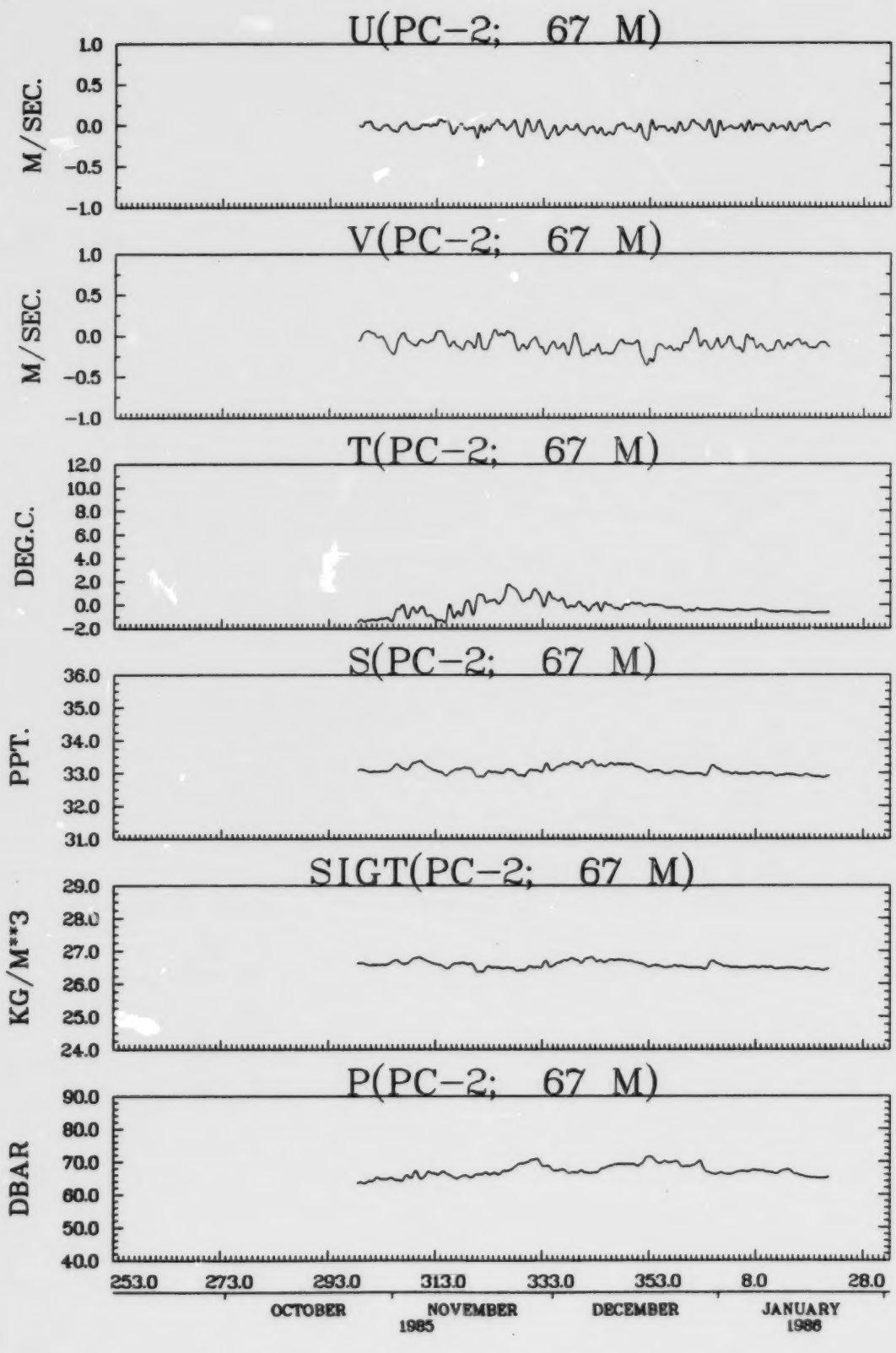




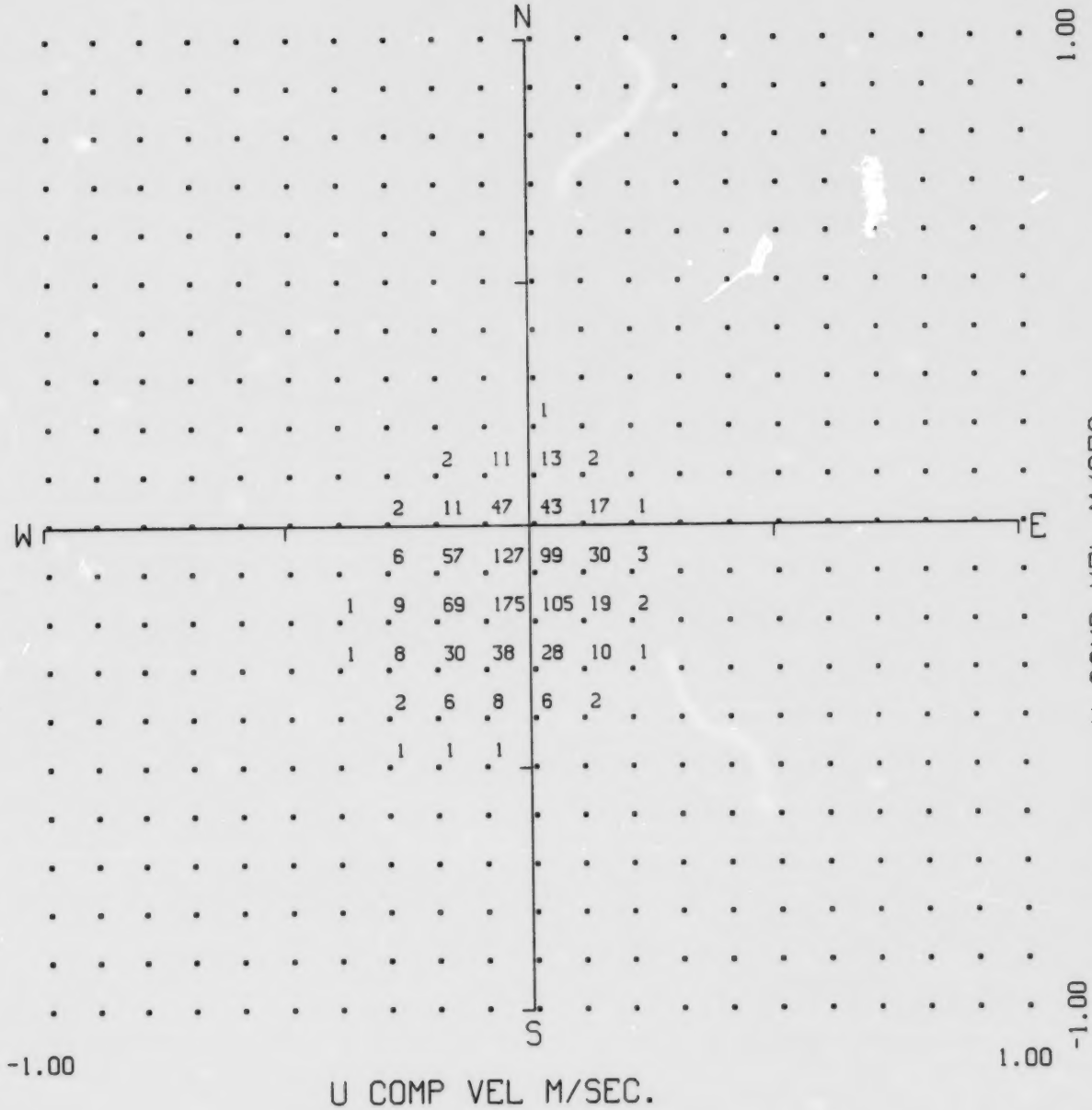
LCVS PC-2 OCT./85 TO JAN./86



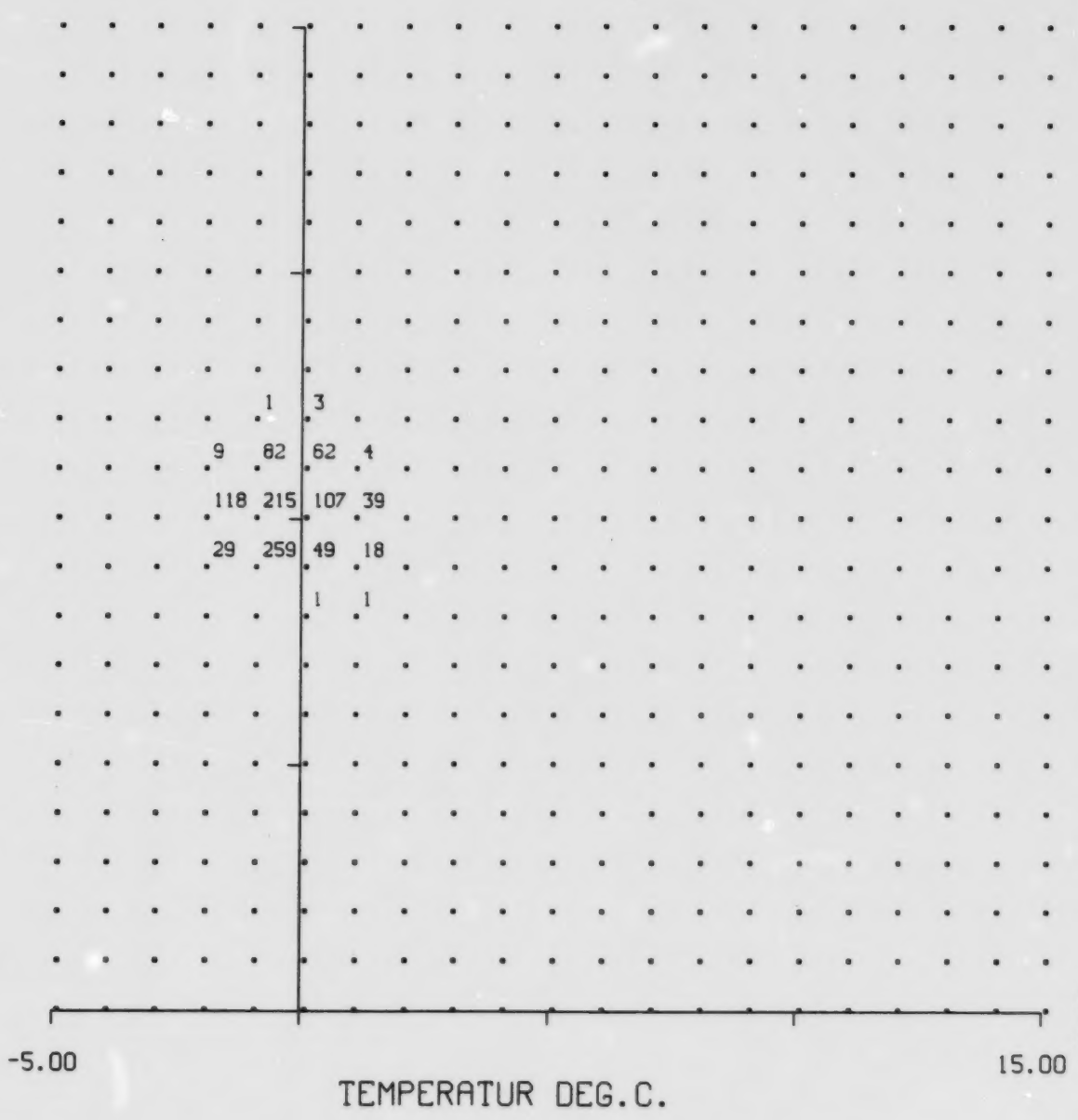
LCVS STATION PC-2 DEPTH 67 M.



LCVS STATION PC-2 DEPTH 67 M.



FREQUENCY DISTRIBUTION PLOT
LCVS STATION PC-2 DEPTH 67 M.
START TIME 22/10/1985 18:20: .0 GMT
FREQUENCY UNIT 0.1%



FREQUENCY DISTRIBUTION PLOT
LCVS STATION PC-2 DEPTH 67 M.
START TIME 22/10/1985 18:20: .0 GMT
FREQUENCY UNIT 0.1%

MOORING PC-2
DEPTH (M) 120

INSTRUMENT	AANDERAA RCM4
SERIAL NUMBER	3666
LATITUDE	46 34.60 N
LONGITUDE	47 48.90 W
WATER DEPTH (M)	140
MOORING DATE;CRUISE	22/10/1985 ; 85-930
DURATION (DAYS)	0.00
SAMPLE INTERVAL	20 MINUTES

COMMENTS

BATTERY FAILED.

MOORING PC-3
DEPTH (M) 20

INSTRUMENT TYPE	N BROWN ACM2
SERIAL NUMBER	1190
LATITUDE	46 26.72 N
LONGITUDE	48 30.96 W
WATER DEPTH (M)	93
MOORING DATE ; CRUISE	10/09/1985 ; 85-929
DURATION (DAYS)	87.57
SAMPLE INTERVAL	20 MINUTES

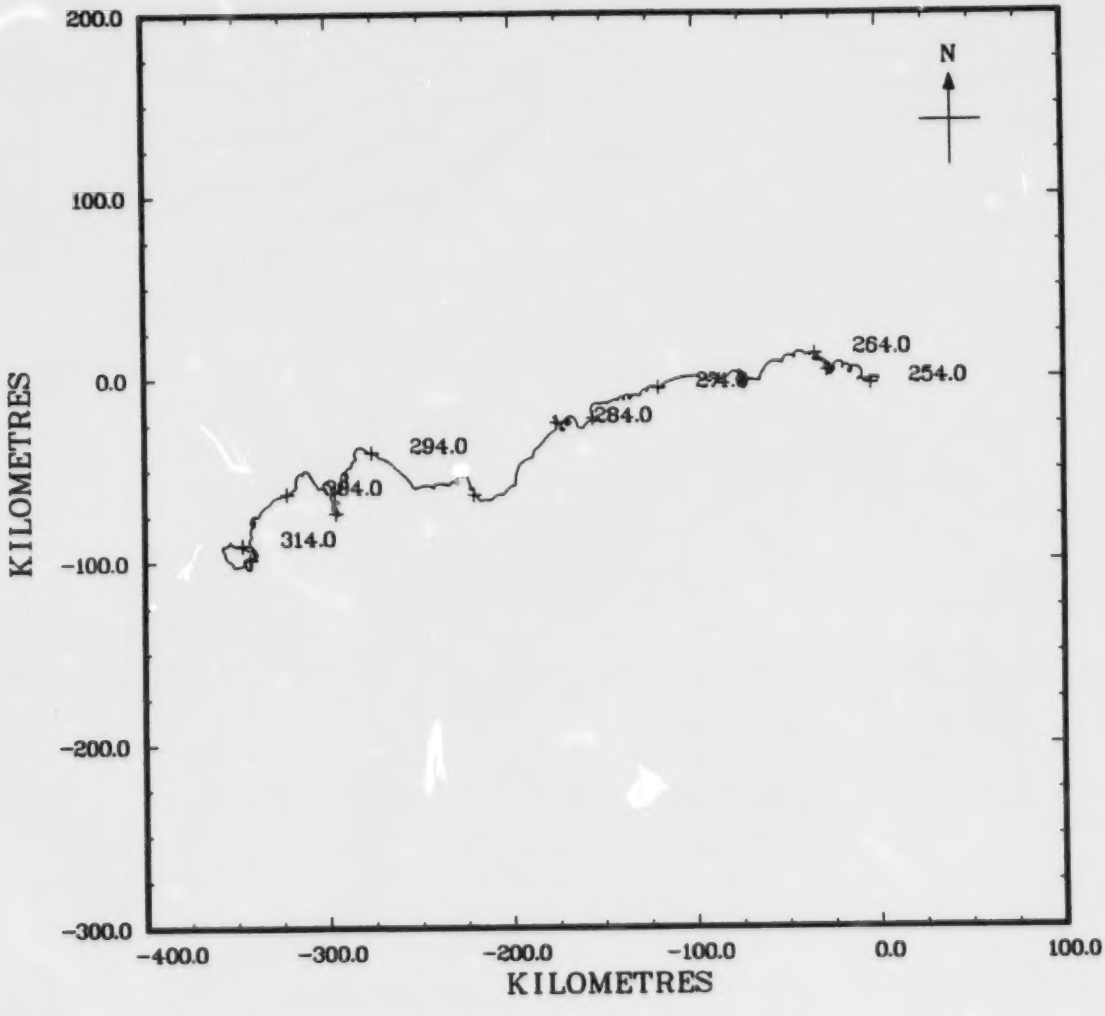
SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
SPEED(M/SEC)	.153	.002	.564	.085	4485
E COMP VEL(M/S)	-.063	-.392	.319	.106	4485
N COMP VEL(M/S)	-.018	-.530	.355	.123	4485
TEMPERATURE(DEG.C.)	6.096	1.110	11.660	3.372	6305
SALINITY	31.936	31.190	32.470	.282	6305
SIGMA-T(KG/M**3)	25.056	24.115	26.002	.513	6305

COMMENTS
---

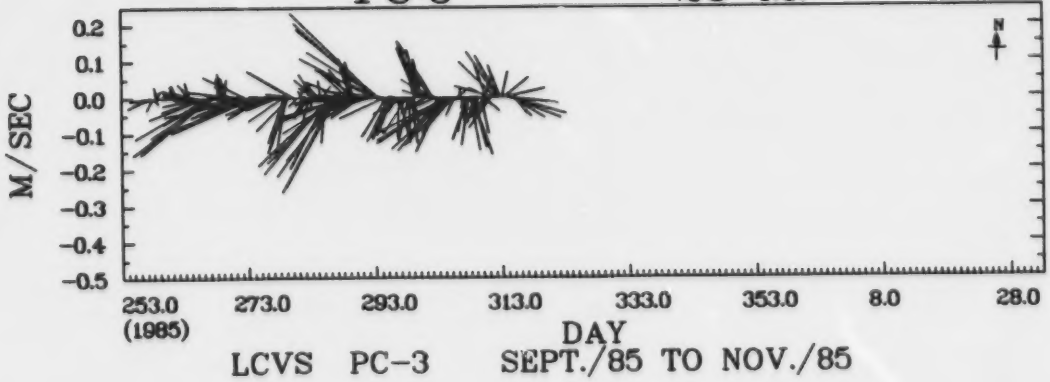
6 HOUR:	SPEED	E COMP VEL	N COMP VEL	TEMPERATURE	SALINITY	SIGMA-T
MEAN	.106	-.064	-.019	6.107	31.916	25.043
STD DEV	.067	.070	.080	3.259	.274	.493

PRESSURE SENSOR MALFUNCTIONED.
SPEED AND DIRECTION WERE SAMPLED AT 2 MINUTES INTERVALS WHILE THE TEMPERATURE AND SALINITY WERE SAMPLED AT 20 MINUTES INTERVALS.

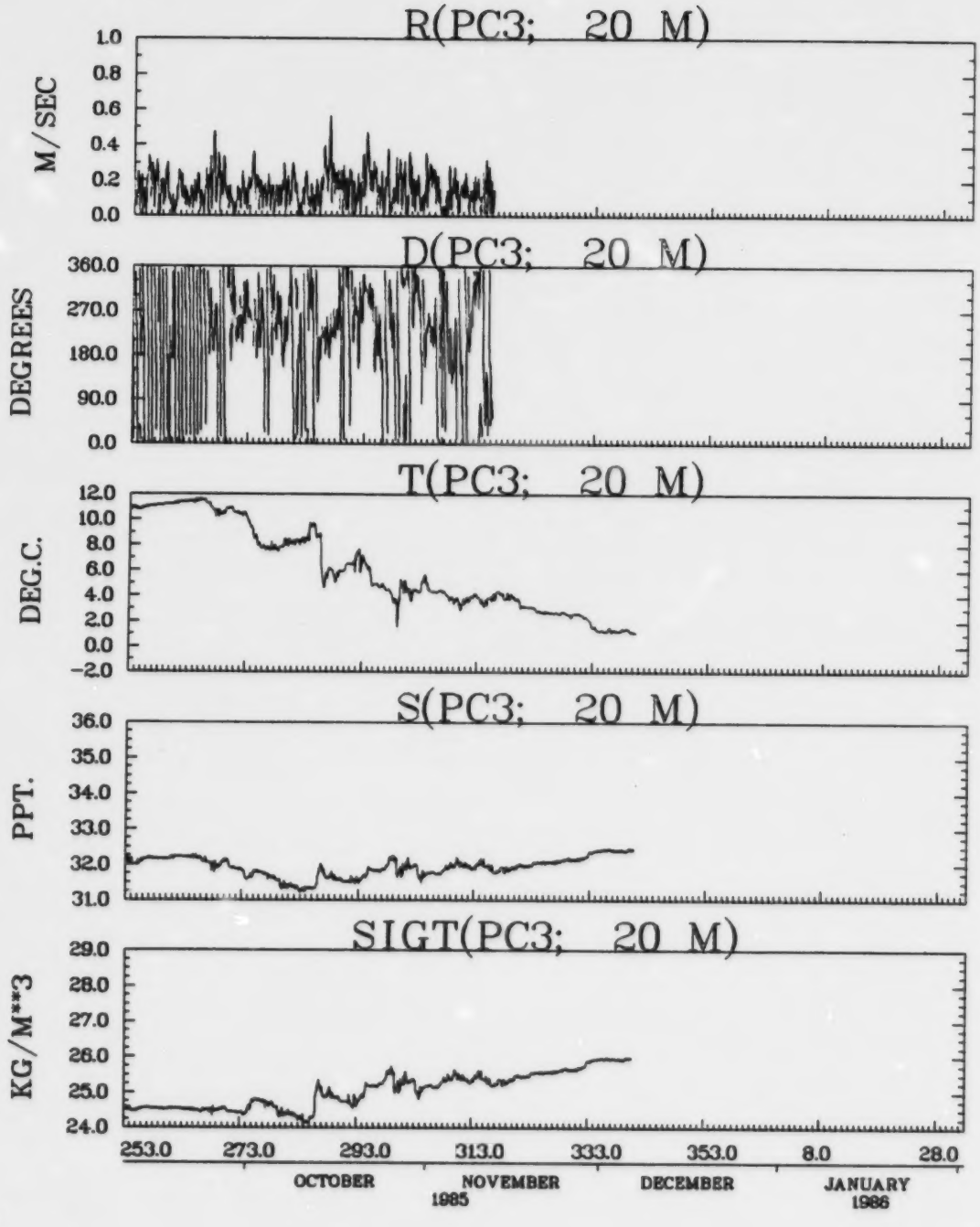
PC-3 20 M.



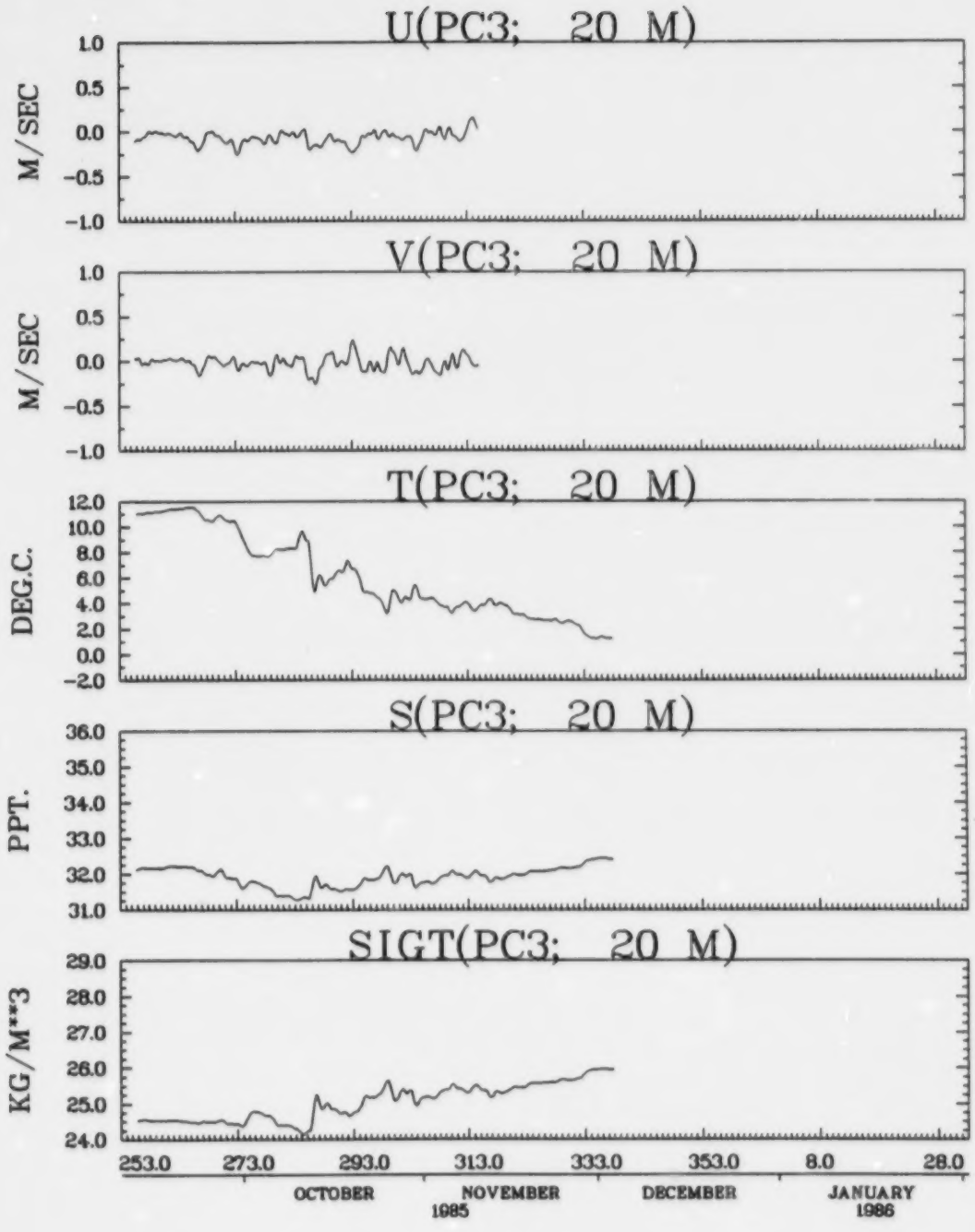
PC-3 20 M.



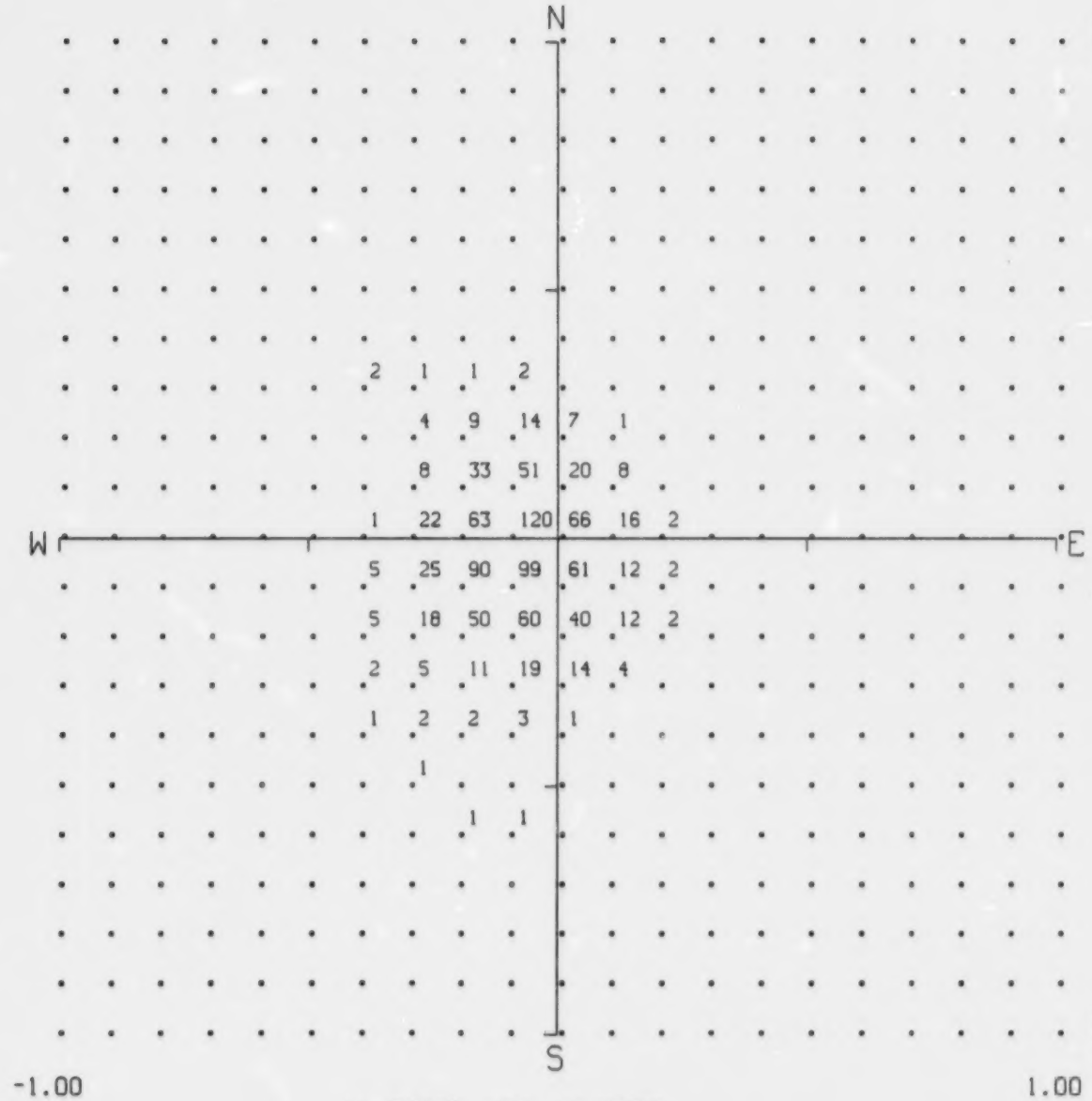
LCVS PC-3 SEPT./85 TO NOV./85



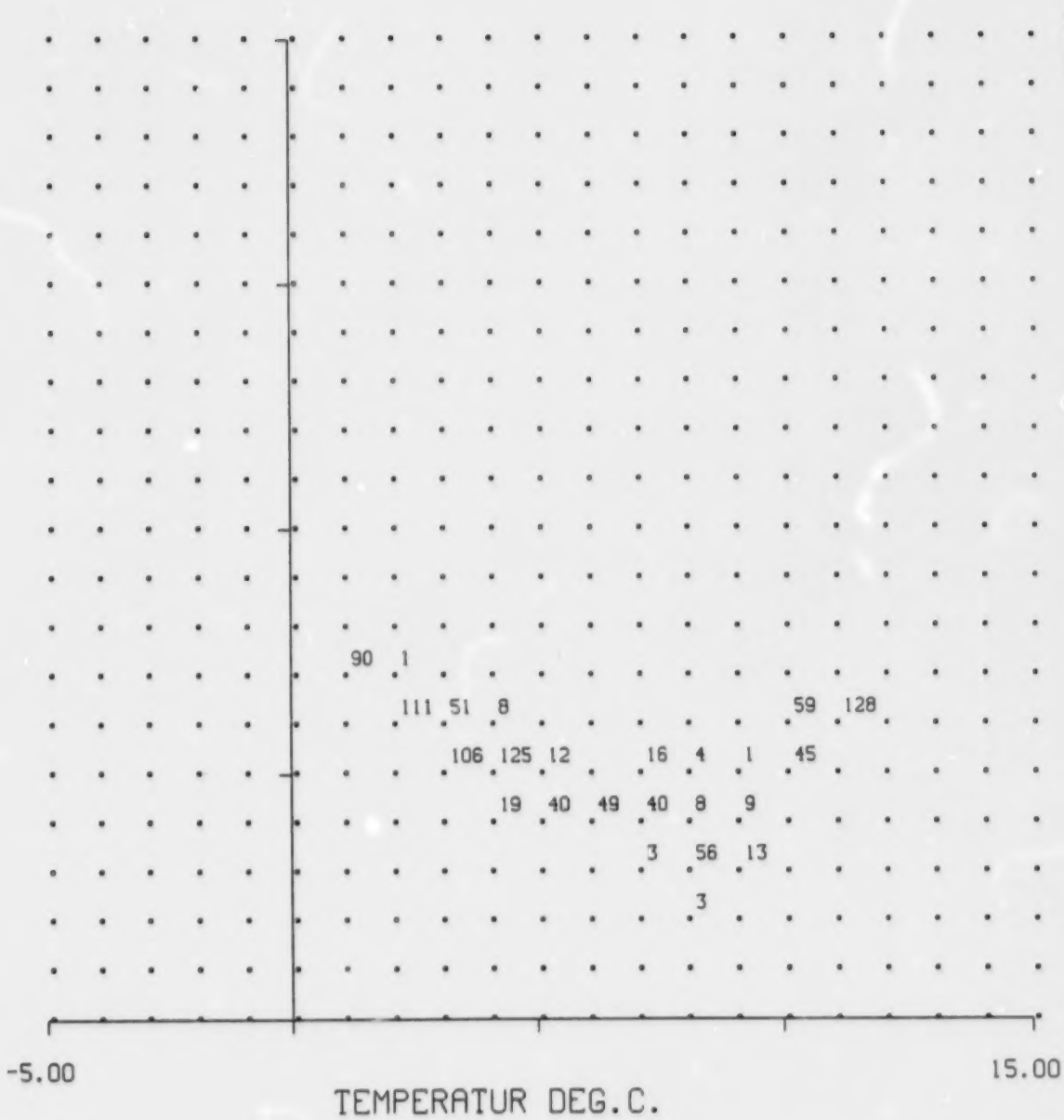
LCVS STATION PC-3 DEPTH 20 M.



LCVS STATION PC-3 DEPTH 20 M.



FREQUENCY DISTRIBUTION PLOT
LCVS STATION PC-3 DEPTH 20 M.
START TIME 10/ 9/1985 0:14: .0 GMT
FREQUENCY UNIT 0.1%



FREQUENCY DISTRIBUTION PLOT
LCVS STATION PC-3 DEPTH 20 M.
START TIME 10/ 9/1985 0:14: .0 GMT
FREQUENCY UNIT 0.1%

MOORING PC-3
DEPTH (M) 80

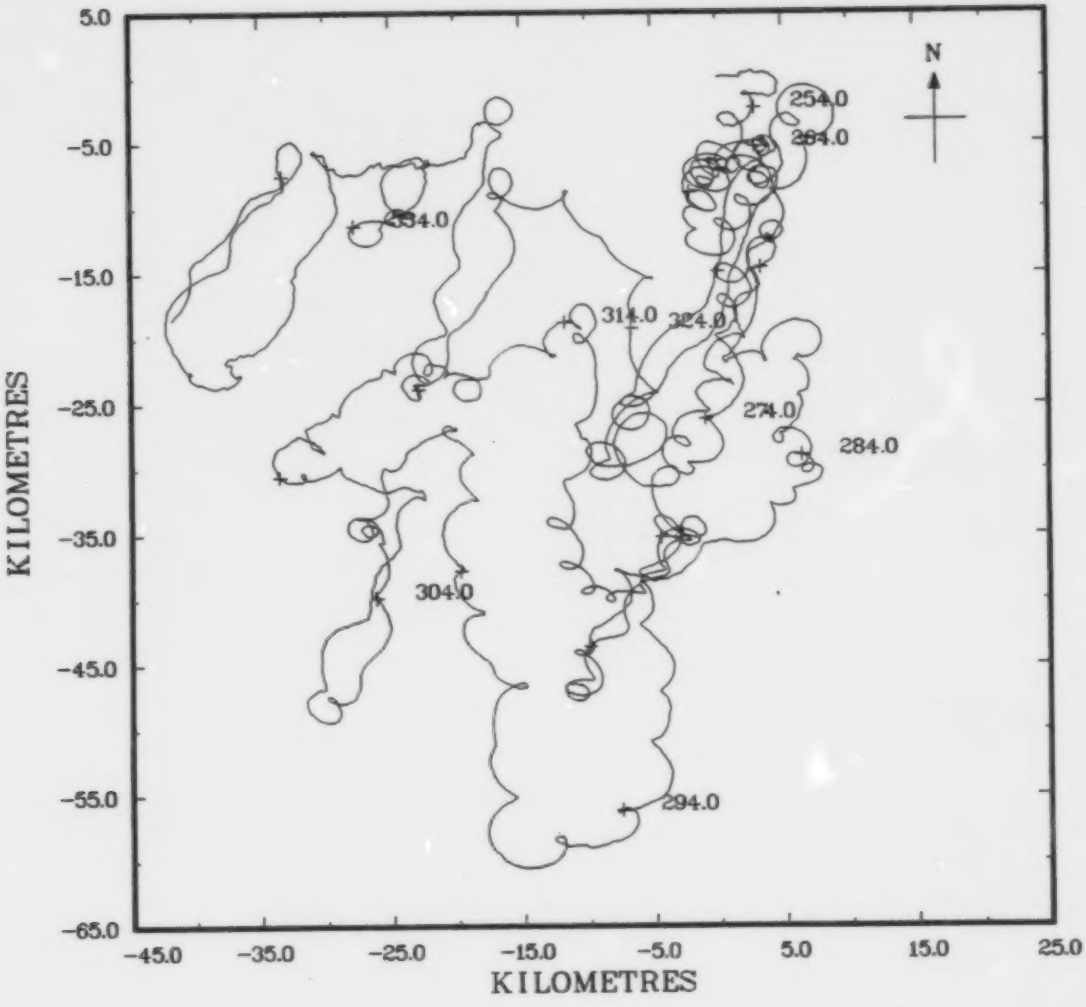
INSTRUMENT TYPE	AANDERAA RCM4
SERIAL NUMBER	4240
LATITUDE	46 26.72 N
LONGITUDE	48 30.96 W
WATER DEPTH (M)	93
MOORING DATE ; CRUISE	10/09/1985 ; 85-929
DURATION (DAYS)	87.60
SAMPLE INTERVAL	20 MINUTES

SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
SPEED(M/SEC)	.128	.016	.421	.050	6307
E COMP VEL(M/S)	-.006	-.298	.275	.096	6307
N COMP VEL(M/S)	-.002	-.253	.377	.098	6307
TEMPERATURE(DEG.C.)	-1.041	-1.530	-.340	.238	6307
SALINITY	33.098	32.830	33.340	.099	6307
PRESSURE(DBARS)	80.362	79.880	81.720	.178	6307
SIGMA-T(KG/M**3)	26.613	26.386	26.821	.086	6307

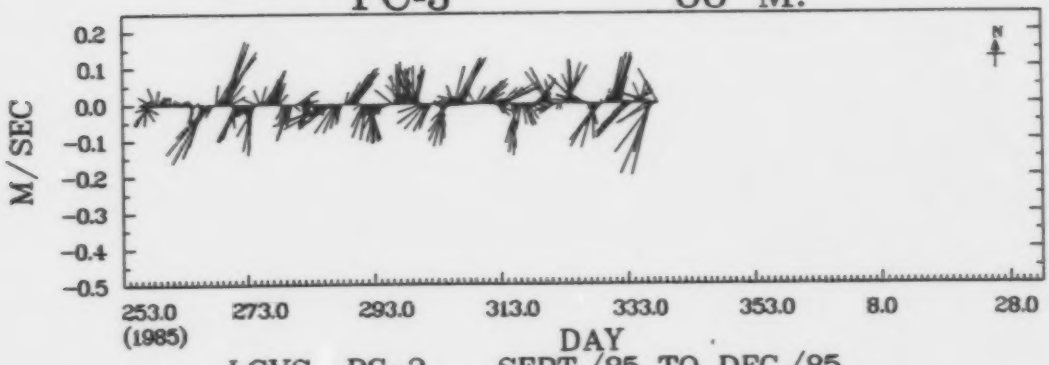
COMMENTS
---

6 HOUR:	SPEED	E VEL	N VEL	PRESSURE	TEMPERATURE	SALINITY	SIGMA-T
MEAN	.073	-.006	-.002	80.368	-1.050	33.100	26.615
STD DEV	.041	.045	.070	.162	.237	.093	.083

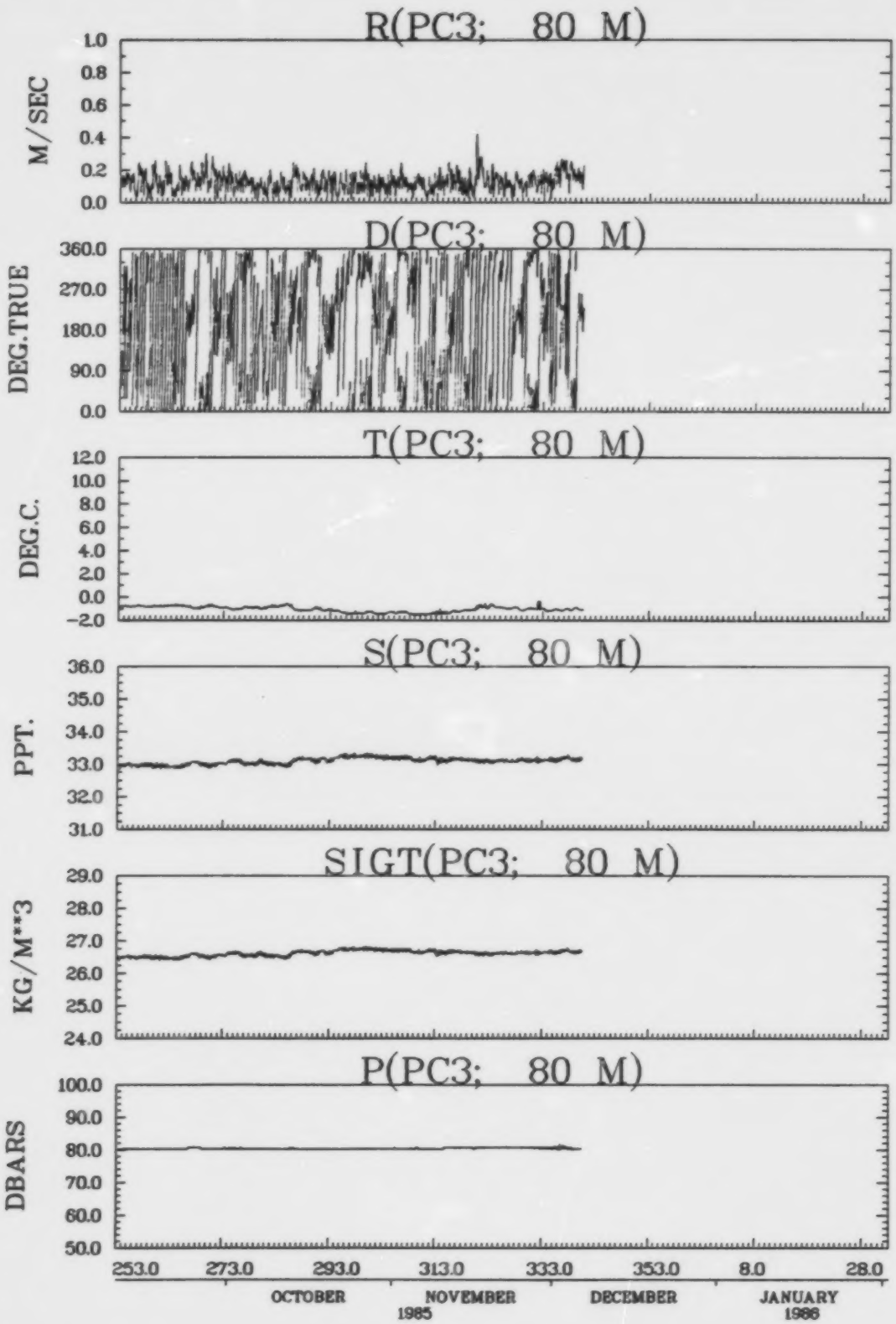
PC-3 80 M.



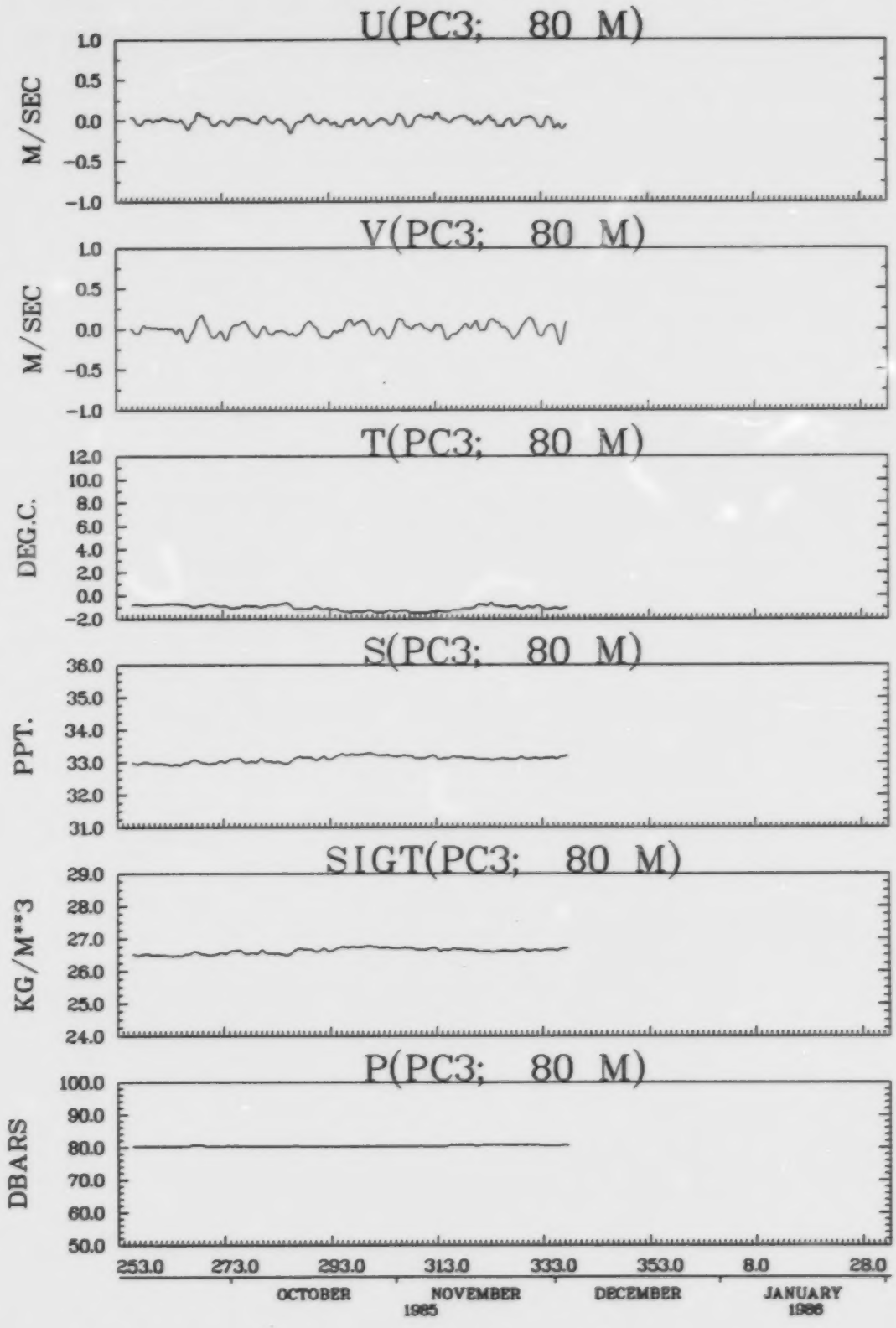
PC-3 80 M.



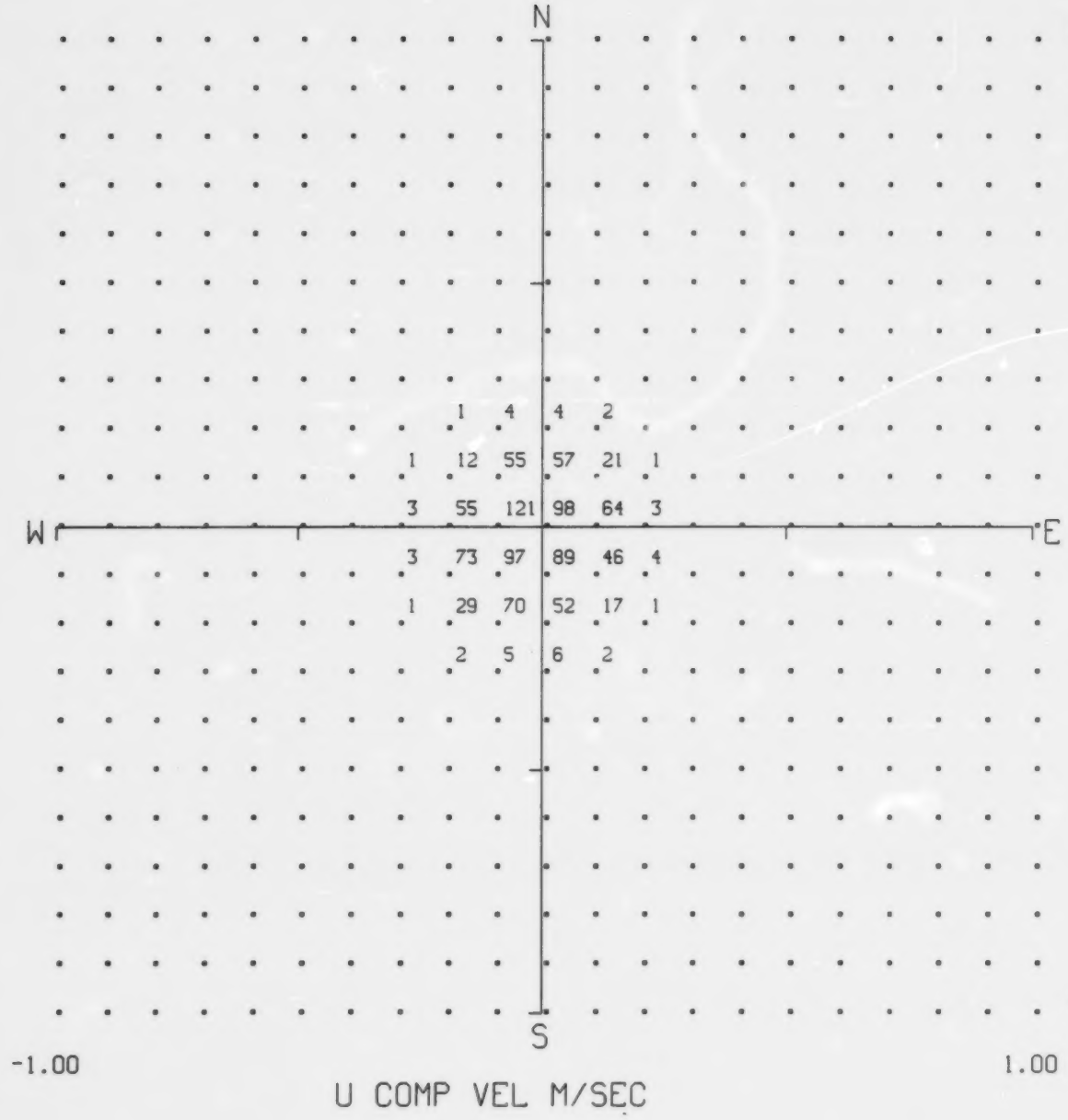
LCVS PC-3 SEPT./85 TO DEC./85



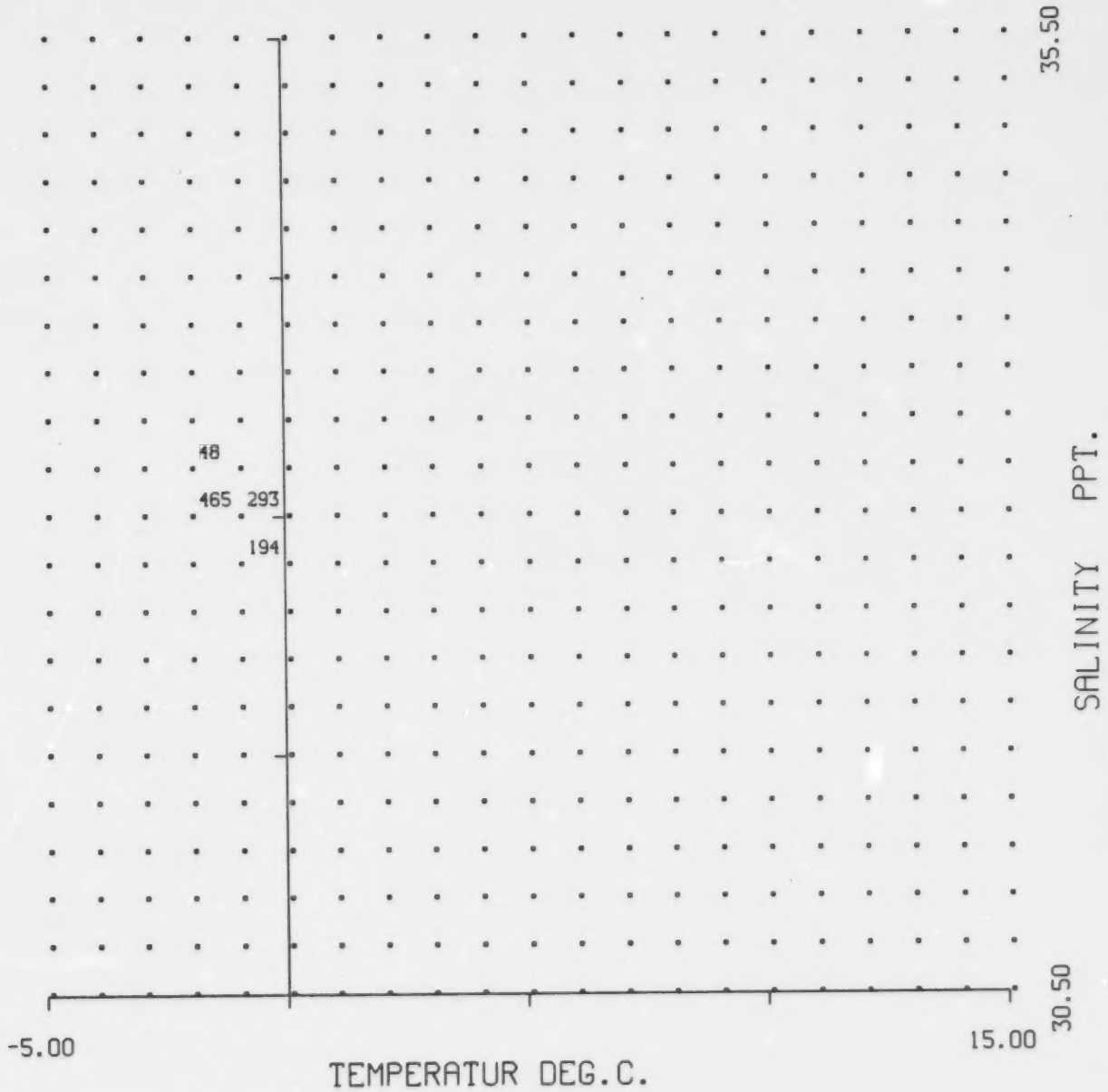
LCVS STATION PC-3 DEPTH 80 M.



LCVS STATION PC-3 DEPTH 80 M.



FREQUENCY DISTRIBUTION PLOT
LCVS STATION PC-3 DEPTH 80 M.
START TIME 10/ 9/1985 0:42: .0 GMT
FREQUENCY UNIT 0.1%



FREQUENCY DISTRIBUTION PLOT
LCVS STATION PC-3 DEPTH 80 M.
START TIME 10/ 9/1985 0:42: .0 GMT
FREQUENCY UNIT 0.1%

MOORING LC-1
DEPTH (M) 50

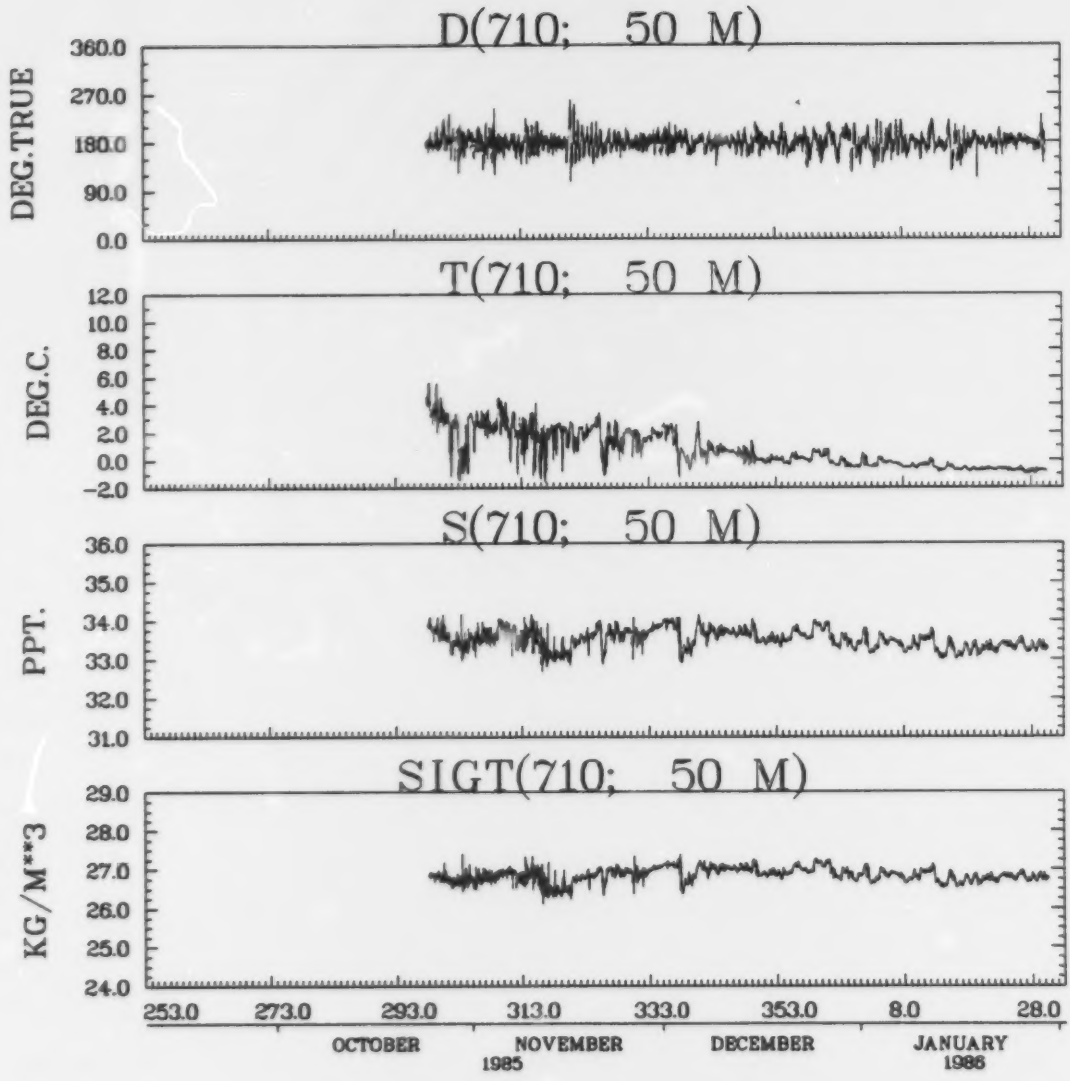
INSTRUMENT TYPE	AANDERAA RCM4
SERIAL NUMBER	4158
LATITUDE	46 51.63 N
LONGITUDE	47 16.95 W
WATER DEPTH (M)	400
MOORING DATE ; CRUISE	24/10/1985 ; 85-930
DURATION (DAYS)	97.56
SAMPLE INTERVAL	20 MINUTES

SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
TEMPERATURE(DEG.C.)	.742	-1.563	5.647	1.361	7024
SALINITY	33.517	32.678	34.186	.246	7024
SIGMA-T(KG/M**3)	26.856	26.112	27.422	.171	7024

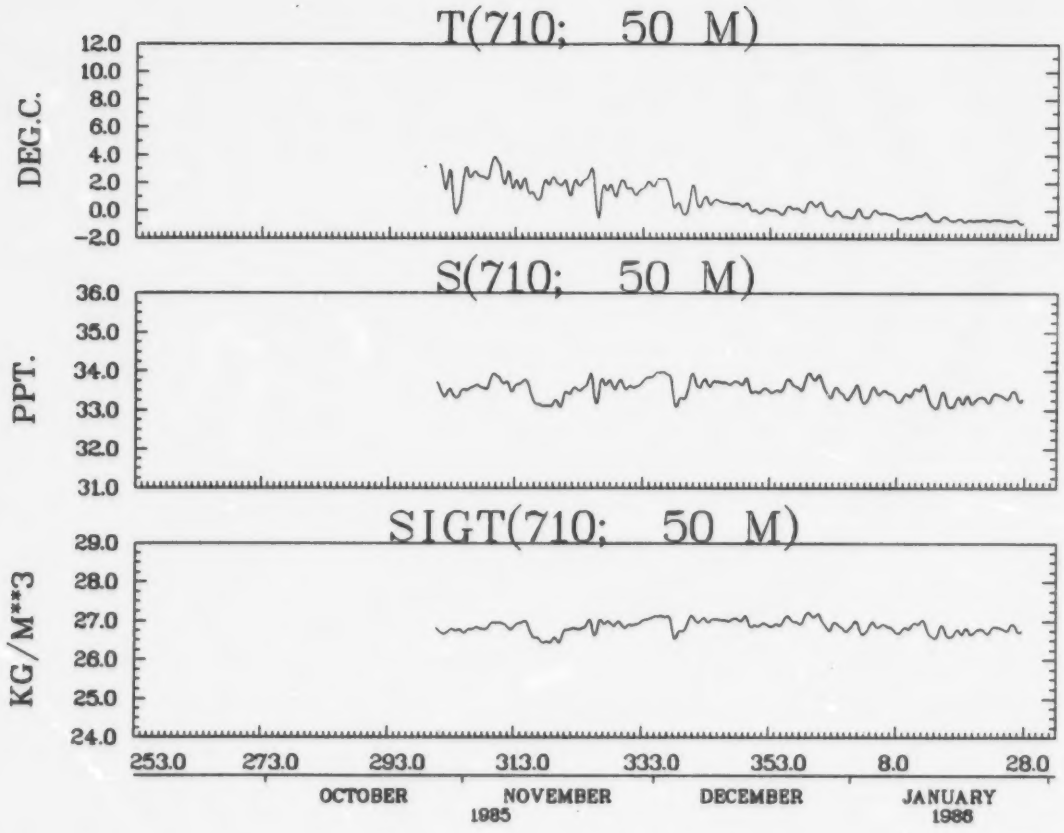
COMMENTS
---

6 HOUR:	TEMPERATURE	SALINITY	SIGMA-T
MEAN	.704	33.515	26.858
STD DEV	1.198	.225	.160

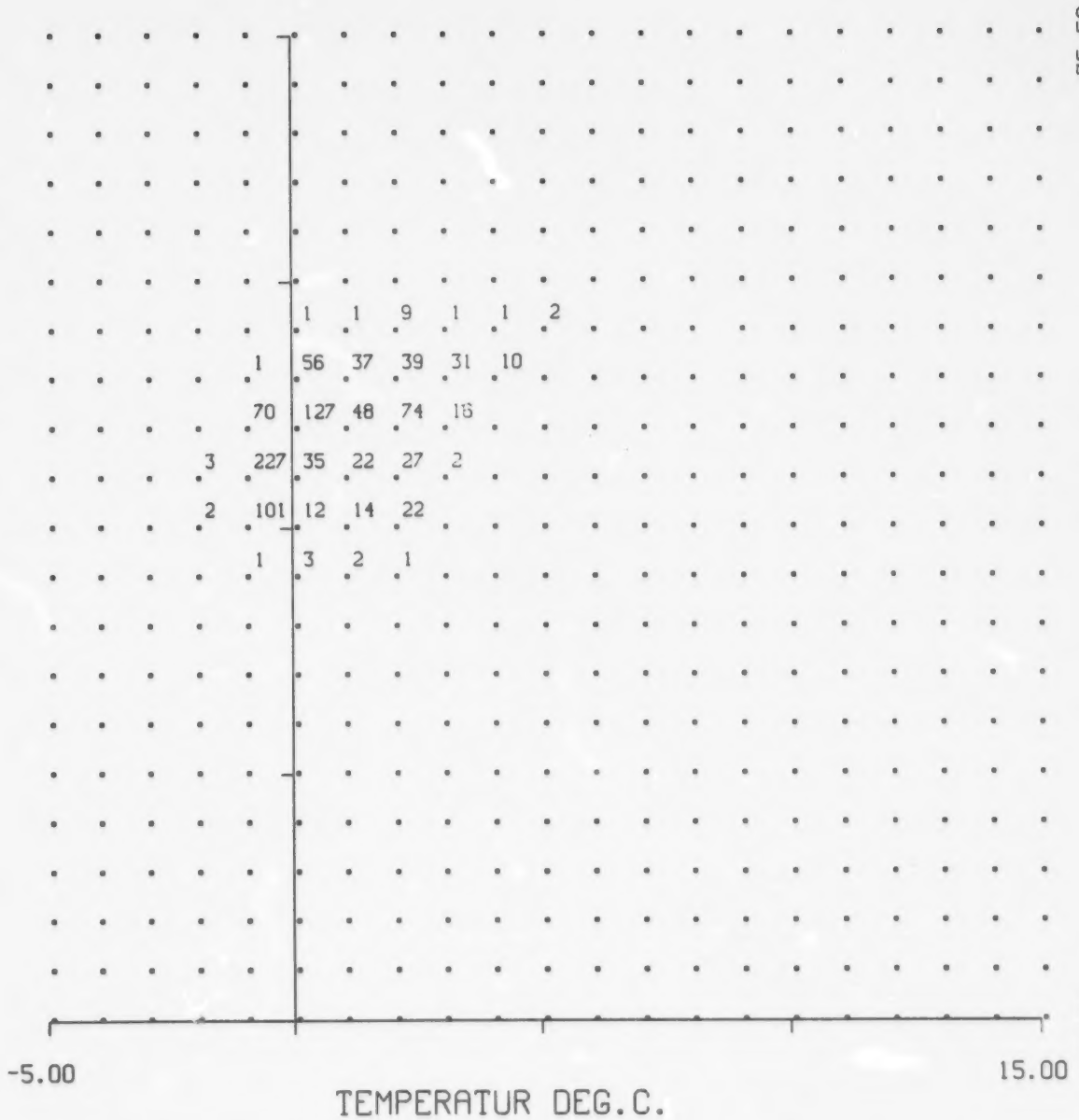
SPEED FAILED FROM THE BEGINNING OF RECORD.



LCVS STATION LC-1 DEPTH 50 M.



LCVS STATION LC-1 DEPTH 50 M.



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-1 DEPTH 50 M.
START TIME 24/10/1985 23:20: .0 GMT
FREQUENCY UNIT 0.1%

MOORING LC-1
DEPTH (M) 100

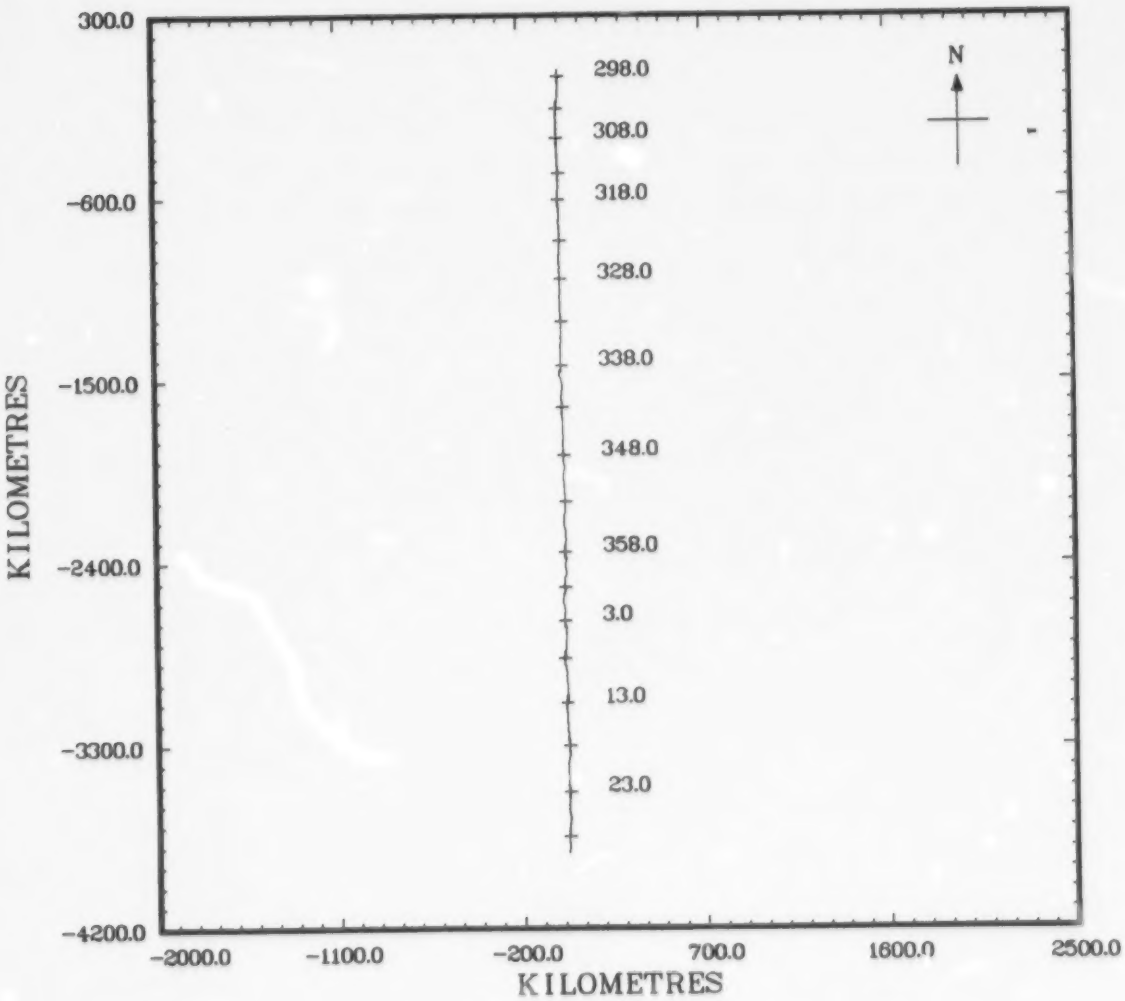
INSTRUMENT TYPE	AANDERAA RCM4
SERIAL NUMBER	822
LATITUDE	46 51.63 N
LONGITUDE	47 16.95 W
WATER DEPTH (M)	400
MOORING DATE ; CRUISE	24/10/1985 ; 85-930
DURATION (DAYS)	97.56
SAMPLE INTERVAL	20 MINUTES

SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
SPEED(M/SEC.)	.464	.156	.859	.117	7024
E COMP VEL(M/S)	.003	-.421	.427	.090	7024
N COMP VEL(M/S)	-.455	-.835	-.104	.119	7024
TEMPERATURE(DEG.C.)	.276	-1.335	3.729	.969	7024
SALINITY	33.914	33.444	34.573	.171	7024
SIGMA-T(KG/M**3)	27.209	26.809	27.731	.104	7024

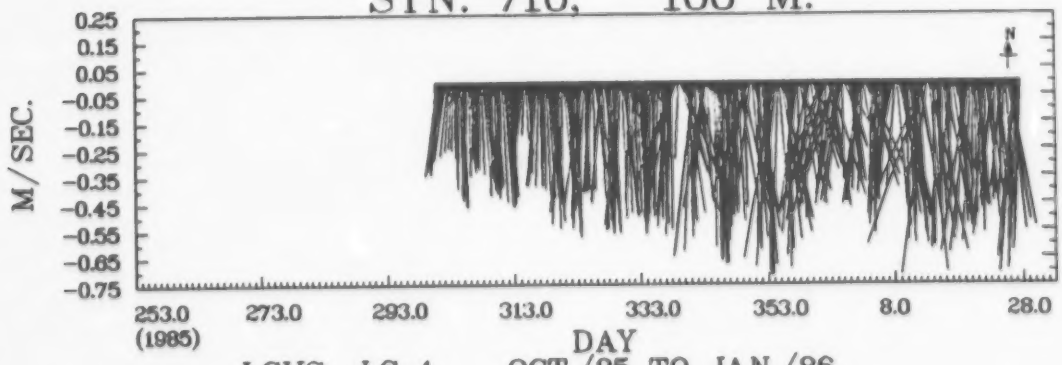
COMMENTS
---

6 HOUR:	SPEED	E COMP VEL	N COMP VEL	TEMPERATURE	SALINITY	SIGMA-T
MEAN	.461	.003	-.458	.311	33.922	27.213
STD DEV	.106	.053	.107	.809	.154	.091

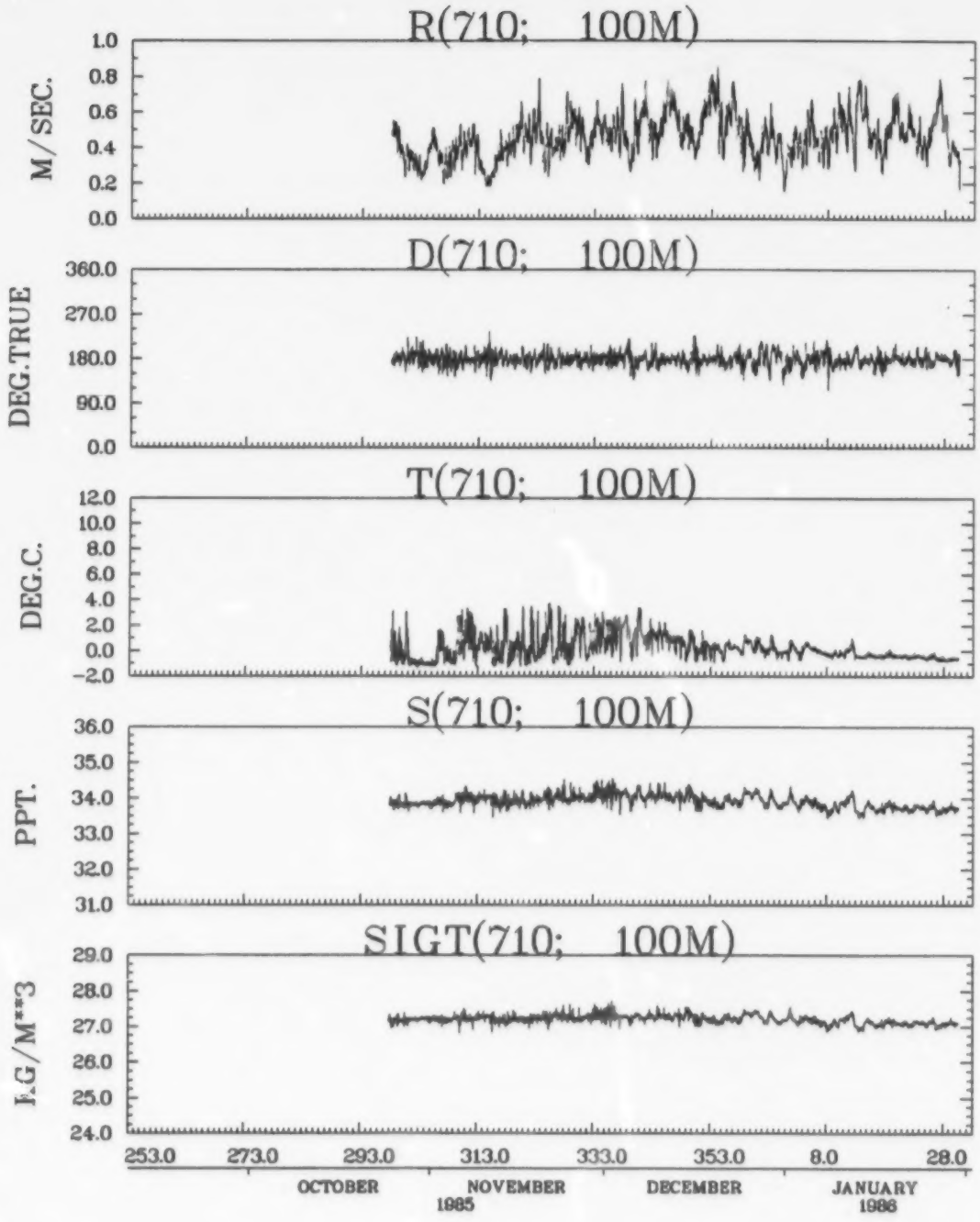
STN. 710, 100 M.



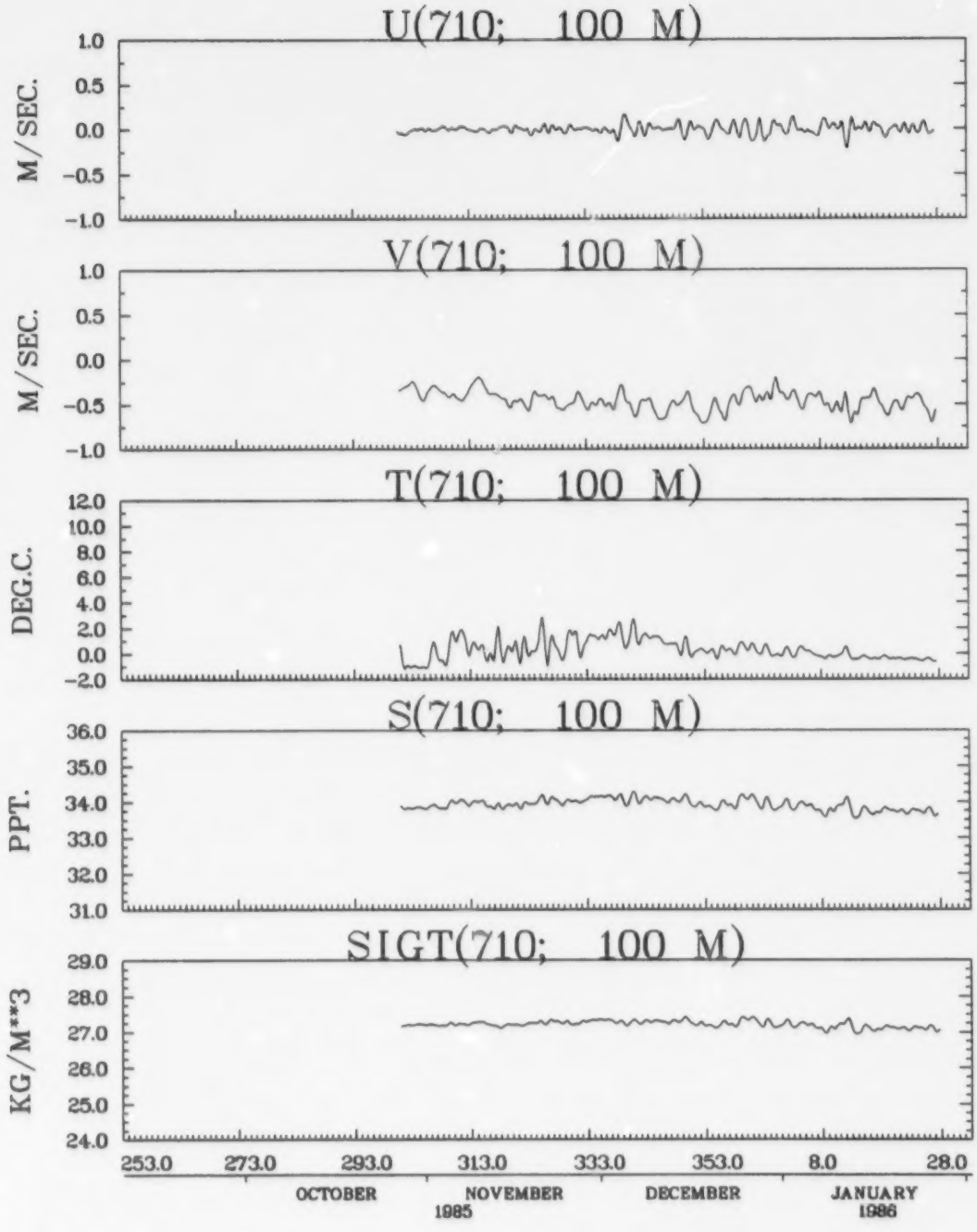
STN. 710, 100 M.



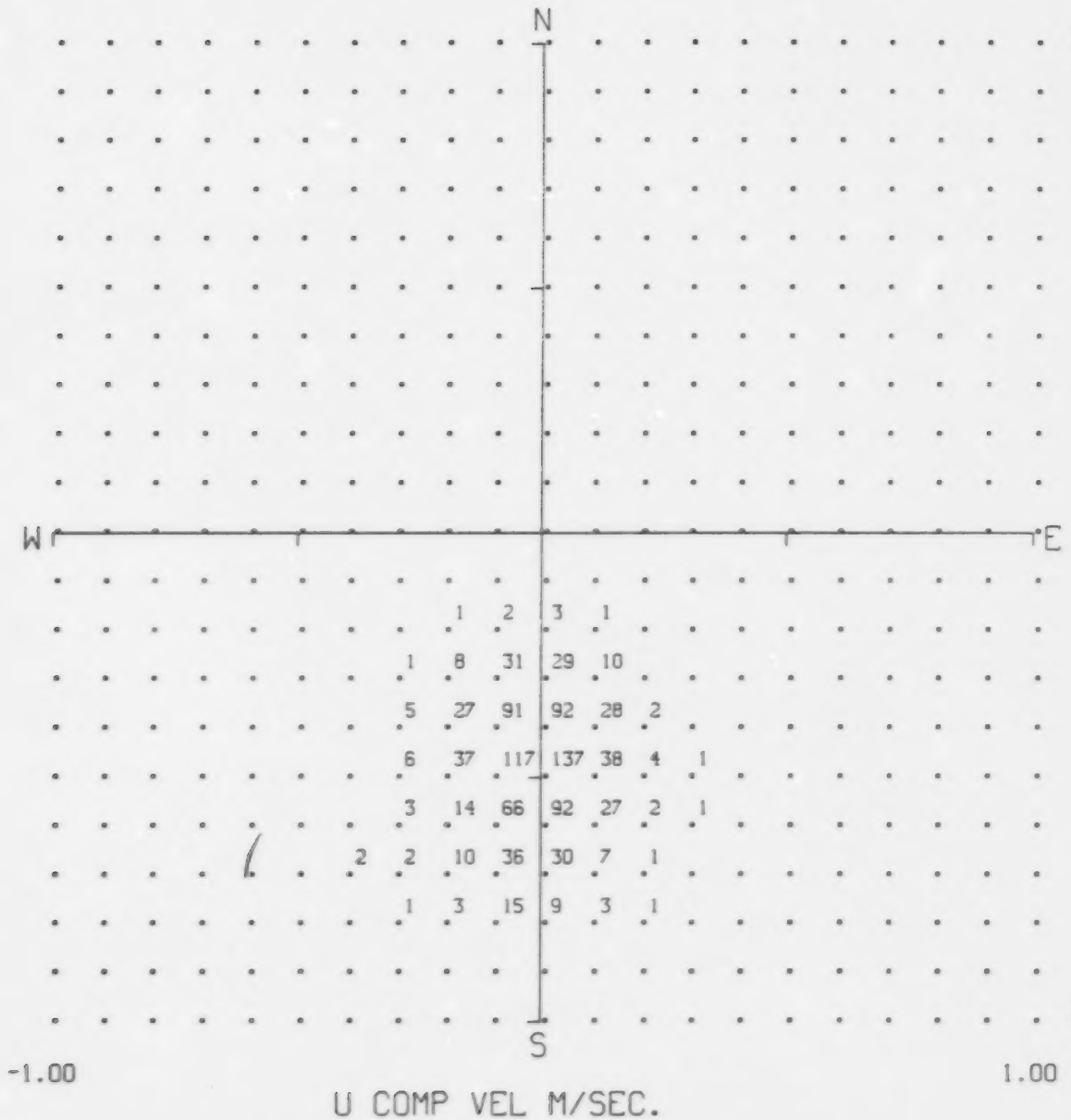
LCVS LC-1 OCT./85 TO JAN./86



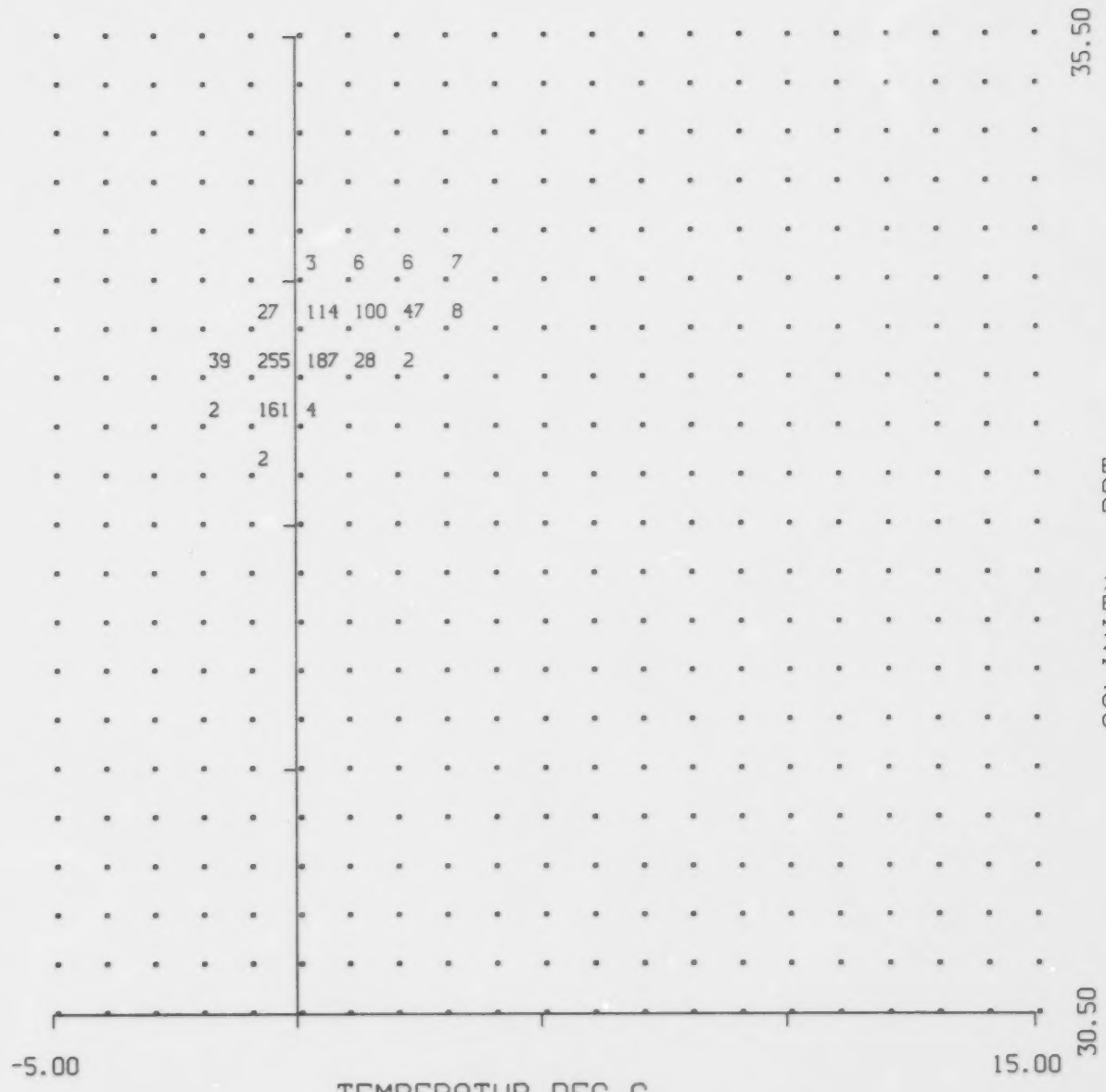
LCVS STATION LC-1 DEPTH 100 M.



LCVS STATION LC-1 DEPTH 100 M.



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-1 DEPTH 100 M.
START TIME 24/10/1985 23:20: .0 GMT
FREQUENCY UNIT 0.1%



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-1 DEPTH 100 M.
START TIME 24/10/1985 23:20: .0 GMT
FREQUENCY UNIT 0.1%

MOORING LC-1
DEPTH (M) 300

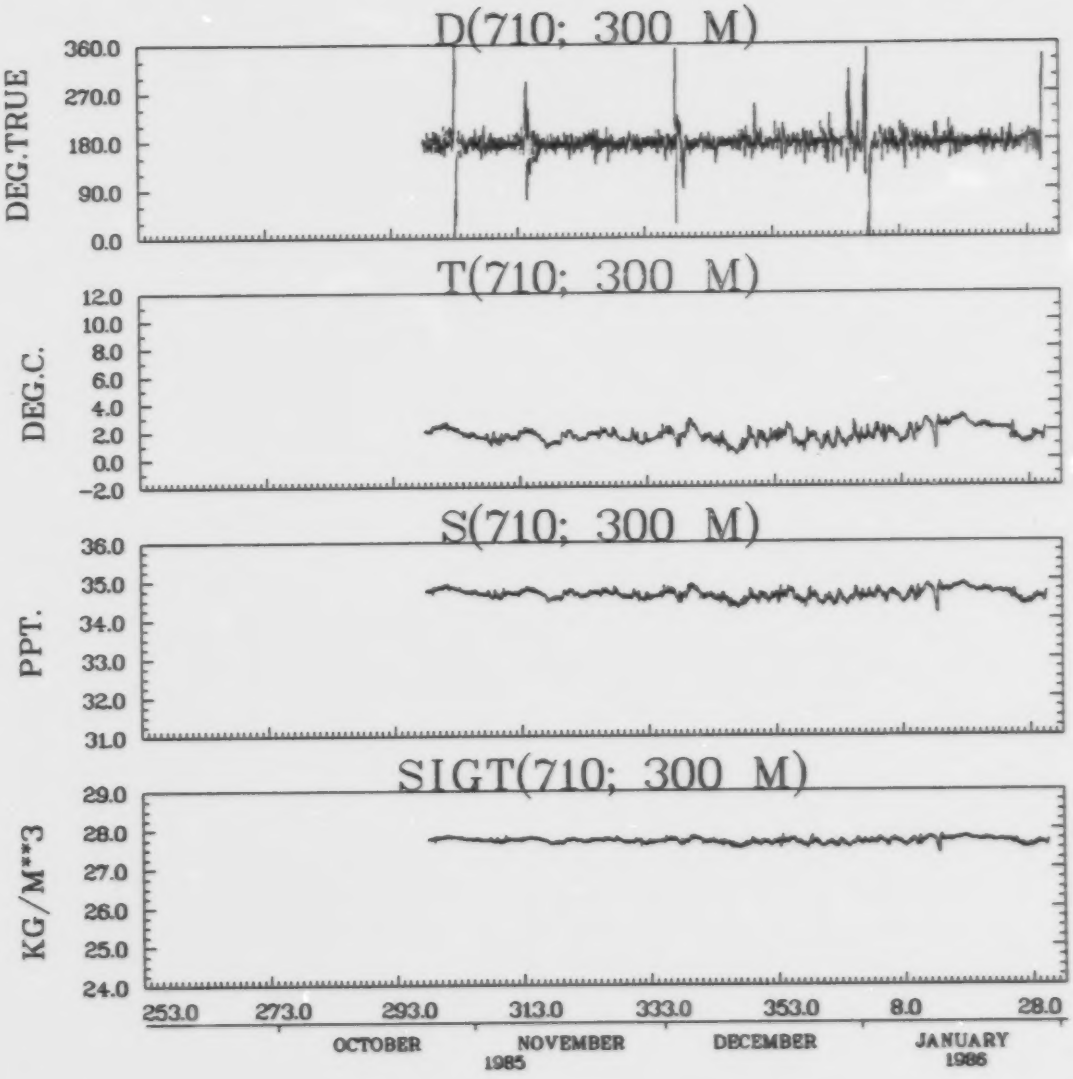
INSTRUMENT TYPE	AANDERAA RCM4
SERIAL NUMBER	2664
LATITUDE	46 51.63 N
LONGITUDE	47 16.95 W
WATER DEPTH (M)	400
MOORING DATE ; CRUISE	24/10/1985 ; 85-930
DURATION (DAYS)	97.56
SAMPLE INTERVAL	20 MINUTES

SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
TEMPERATURE(DEG.C.)	1.716	.270	3.167	.509	7024
SALINITY	34.635	34.154	34.968	.127	7024
SIGMA-T(KG/M**3)	27.701	27.378	27.873	.069	7024

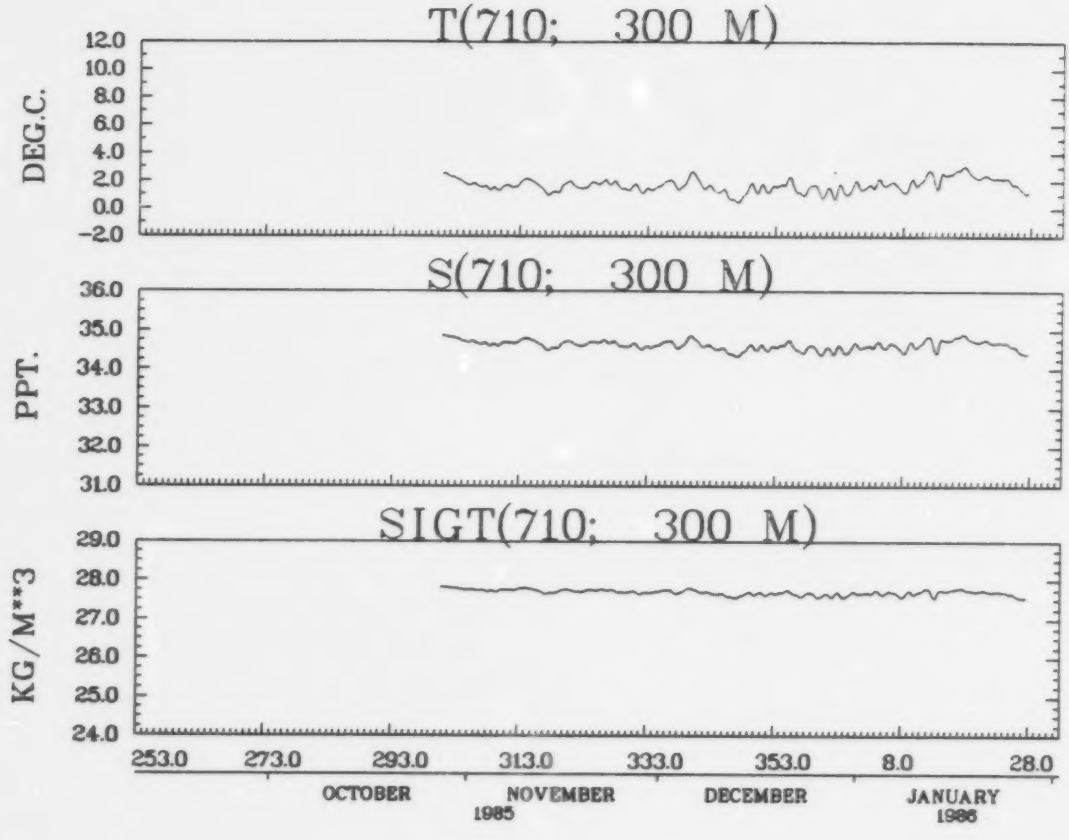
COMMENTS
---

6 HOUR:	TEMPERATURE	SALINITY	SIGMA-T
MEAN	1.710	34.634	27.701
STD DEV	.480	.116	.062

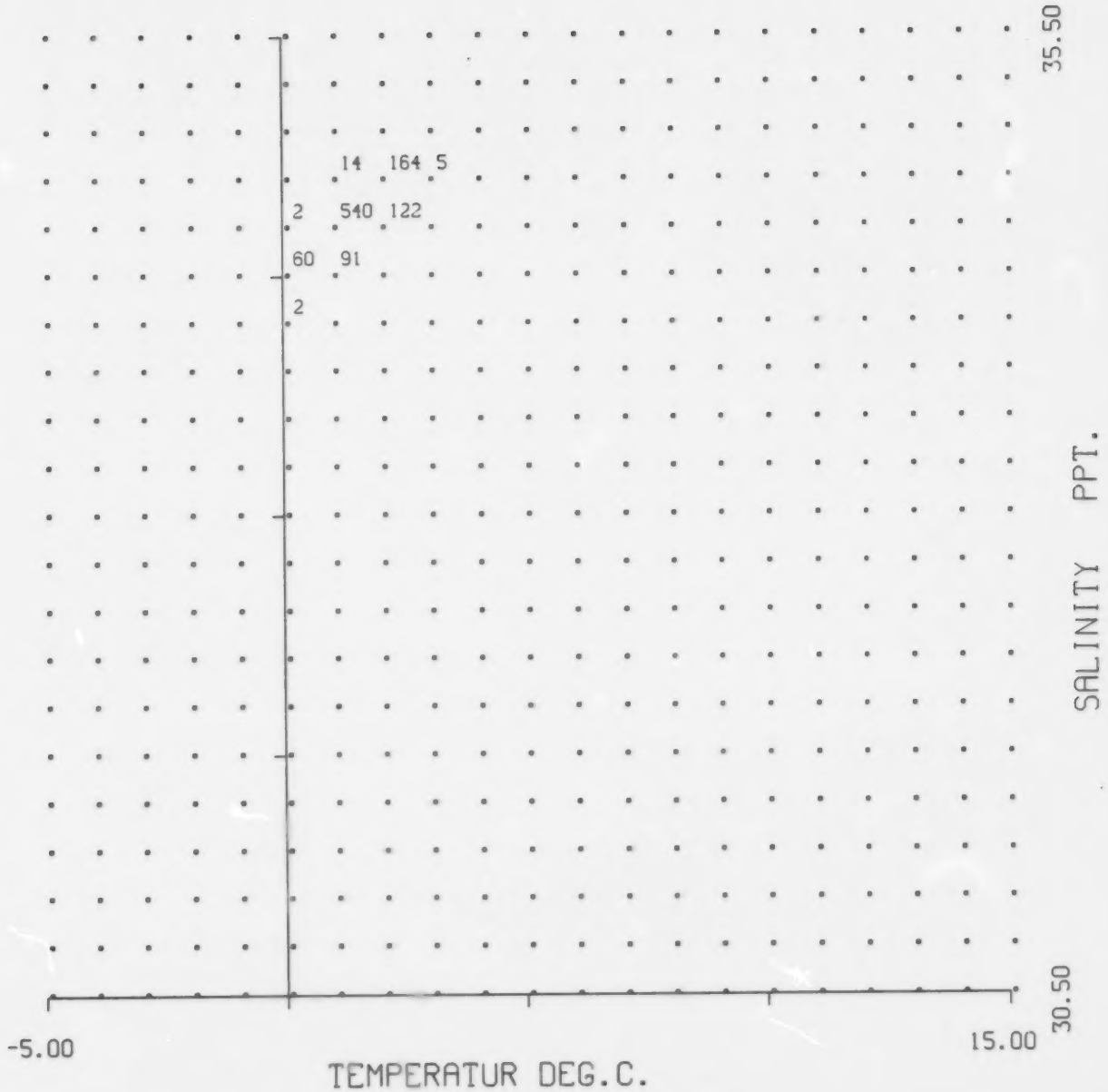
ROTOR WAS MISSING FROM THE BEGINNING OF RECORD.



LCVS STATION LC-1 DEPTH 300 M.



LCVS STATION LC-1 DEPTH 300 M.



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-1 DEPTH 300 M.
START TIME 24/10/1985 23:20: .0 GMT
FREQUENCY UNIT 0.1%

MOORING LC-2
DEPTH (M) 50

INSTRUMENT	AANDERAA RCM4
SERIAL NUMBER	7126
LATITUDE	46 51.63 N
LONGITUDE	47 16.95 W
WATER DEPTH (M)	400
MOORING DATE;CRUISE	26/10/1985 ; 85-930
DURATION (DAYS)	0.00
SAMPLE INTERVAL	20 MINUTES

COMMENTS

TAPE SNARLED ON TAKEUP REEL.

MOORING LC-2
DEPTH (M) 100

INSTRUMENT	AANDERAA RCM4
SERIAL NUMBER	3300
LATITUDE	46 51.63 N
LONGITUDE	47 16.95 W
WATER DEPTH (M)	400
MOORING DATE;CRUISE	26/10/1985 ; 85-930
DURATION (DAYS)	0.00
SAMPLE INTERVAL	20 MINUTES

COMMENTS

TAPE SNARLED ON TAKEUP REEL.

MOORING LC-2
DEPTH (M) 300

INSTRUMENT TYPE	AANDERAA RCM4
SERIAL NUMBER	3579
LATITUDE	47 4.67 N
LONGITUDE	47 17.29 W
WATER DEPTH (M)	400
MOORING DATE ; CRUISE	26/10/1985 ; 85-930
DURATION (DAYS)	96.50
SAMPLE INTERVAL	20 MINUTES

SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
SPEED(M/SEC.)	.255	.042	.560	.107	2293
E COMP VEL(M/S)	-.001	-.160	.152	.044	2293
N COMP VEL(M/S)	-.250	-.558	.008	.110	2293
TEMPERATURE(DEG.C.)	1.717	.178	3.409	.502	6948
SALINITY	34.817	34.431	35.259	.114	6948
SIGMA-T(KG/M**3)	27.847	27.591	28.070	.059	6948

COMMENTS
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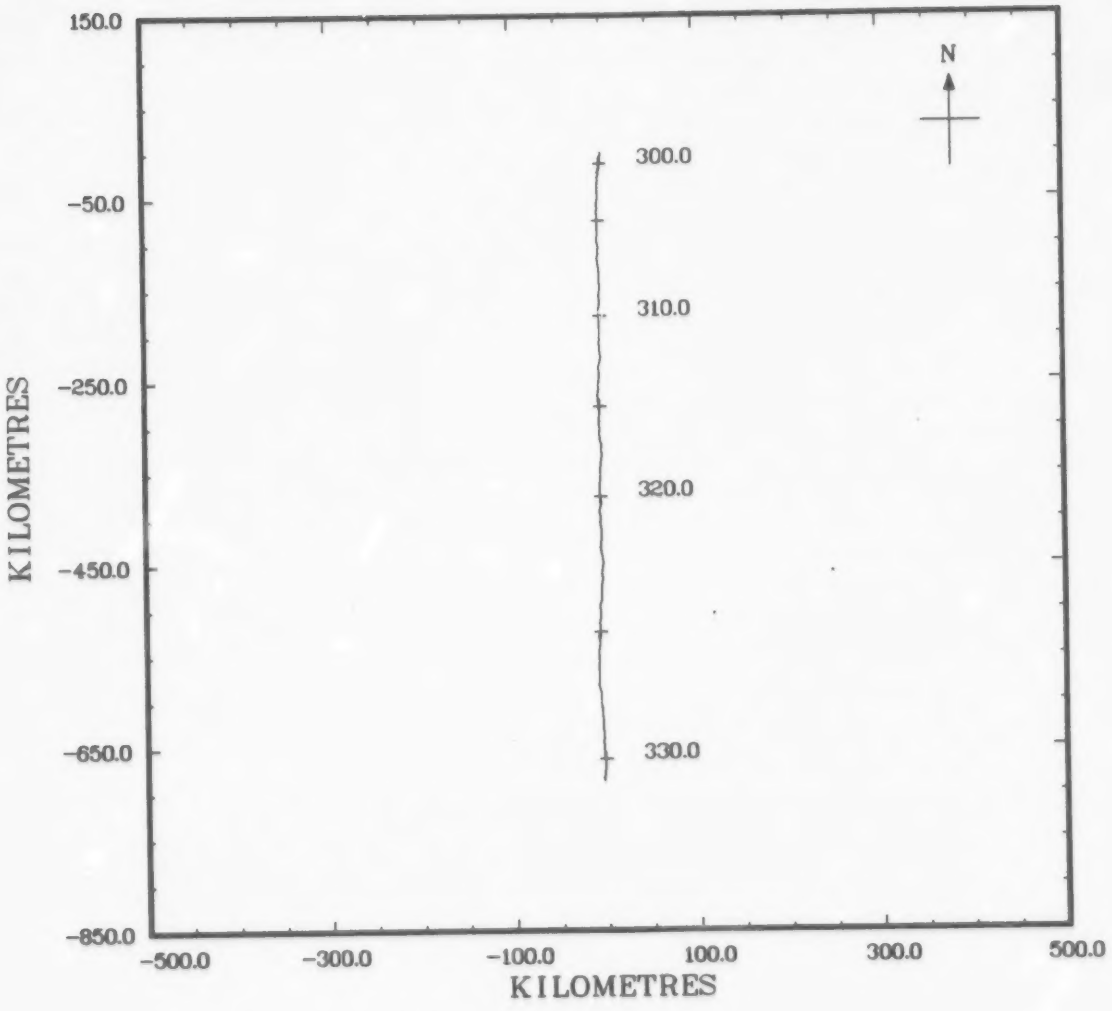
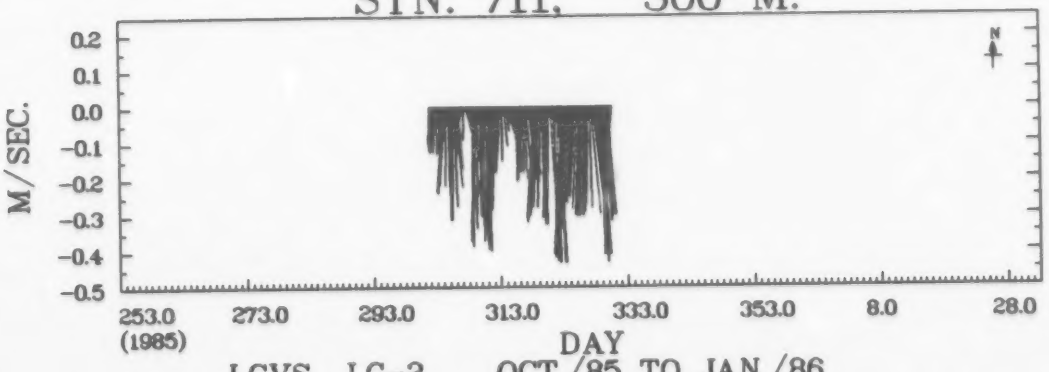
6 HOUR:	SPEED	E COMP VEL	N COMP VEL	TEMPERATURE	SALINITY	SIGMA-T
MEAN	.262	.000	-.262	1.710	34.817	27.847
STD DEV	.098	.015	.098	.484	.107	.053

ROTOR MISSING FROM DAY 330 1985.
DIRECTION NOT PLOTTED AFTER DAY 330, 1985, BECAUSE MOBIL SENT DATA AS U & V COMPONENTS.

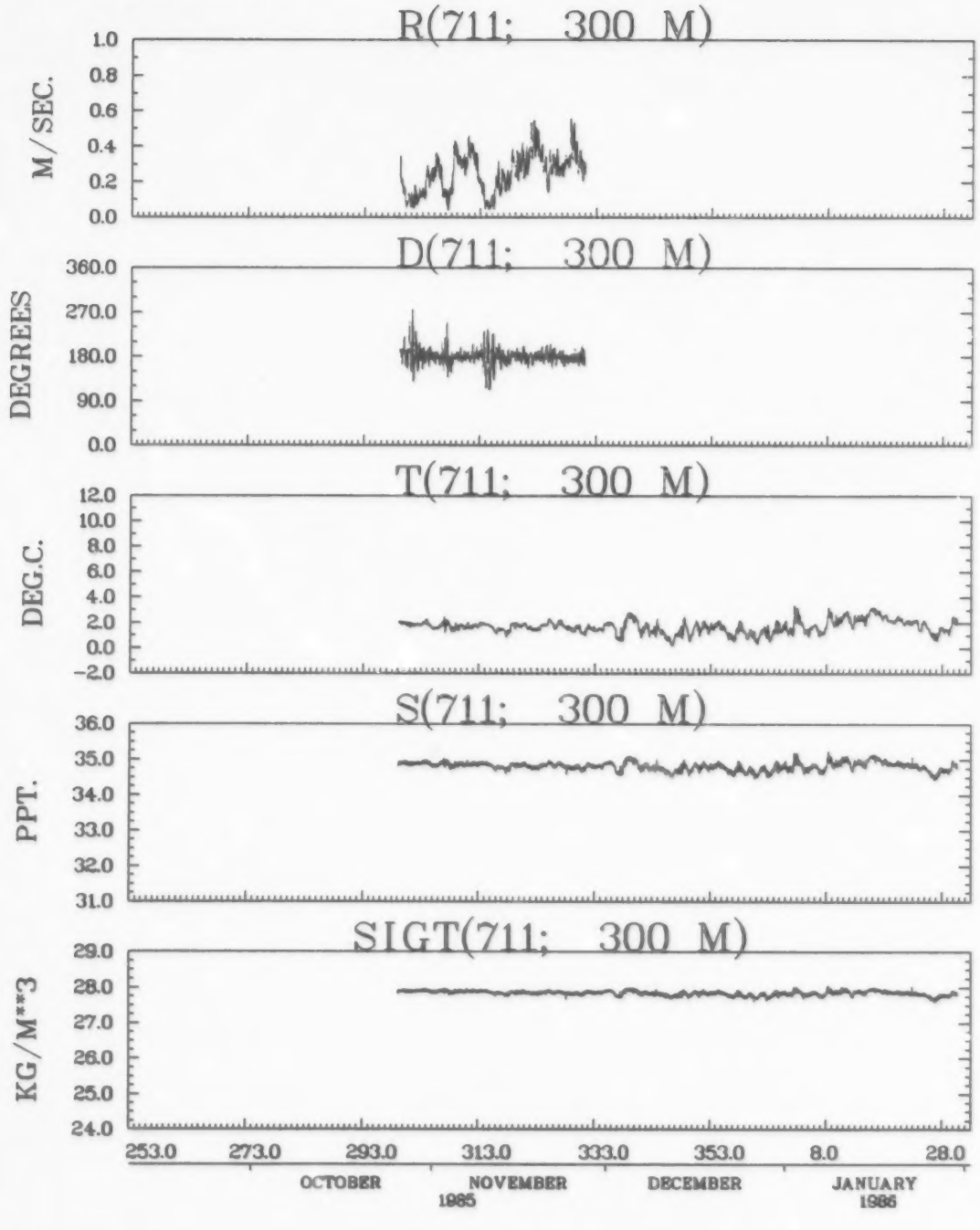
STN. 711, 300 M.



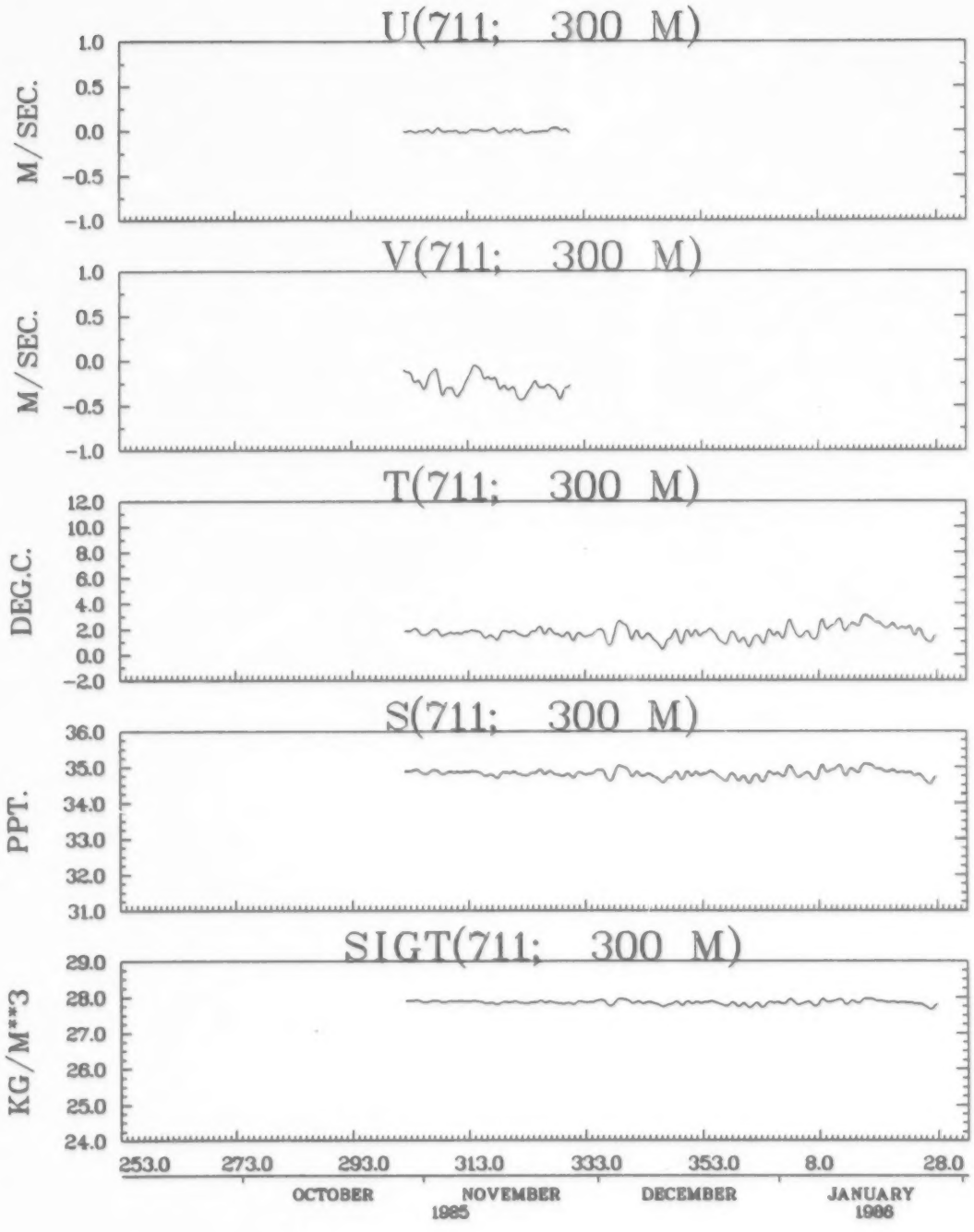
STN. 711, 300 M.



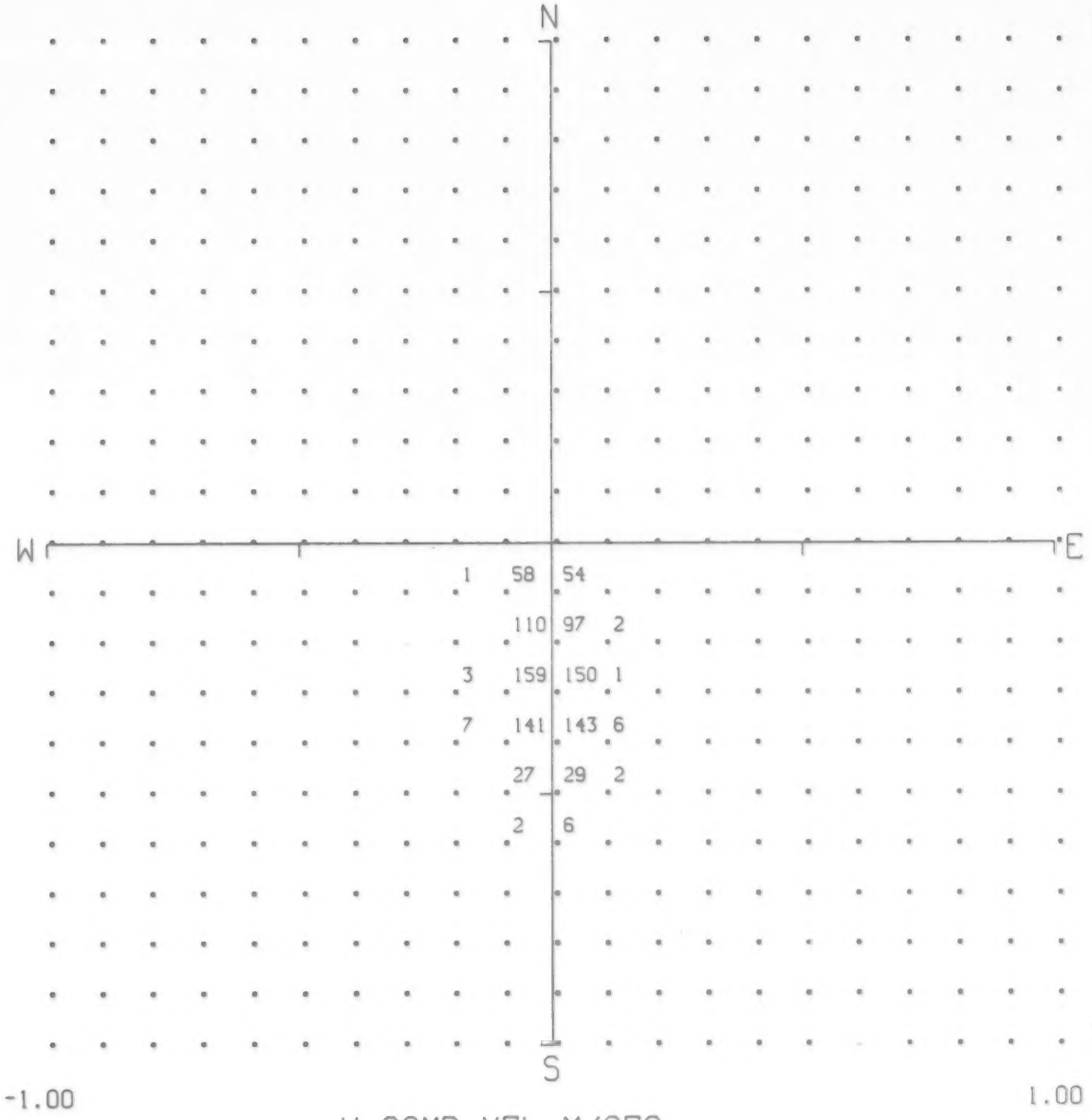
LCVS LC-2 OCT./85 TO JAN./86



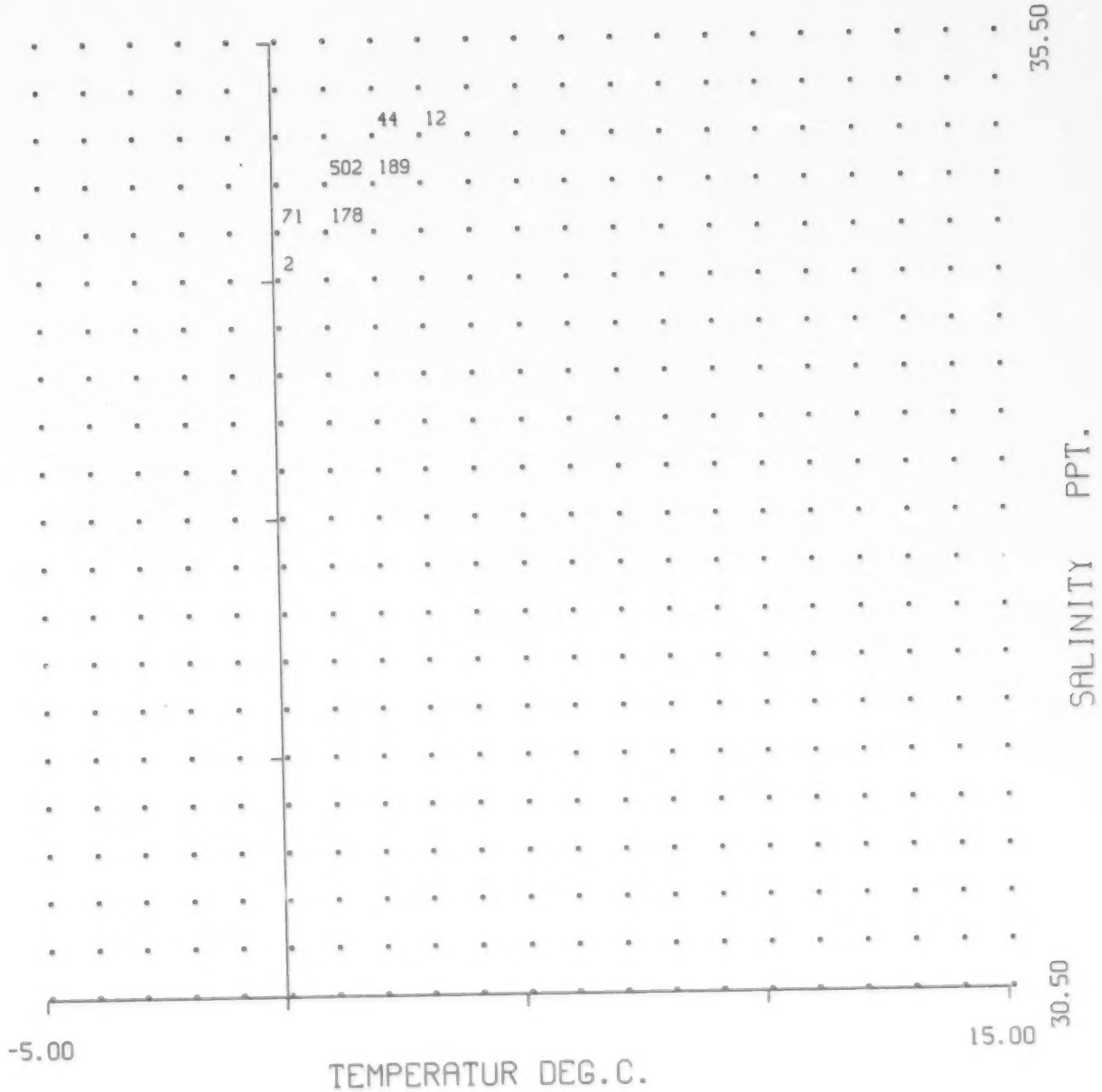
LCVS STATION LC-2 DEPTH 300 M.



LCVS STATION LC-2 DEPTH 300 M.



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-2 DEPTH 300 M.
START TIME 26/10/1985 3:40: .0 GMT
FREQUENCY UNIT 0.1%



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-2 DEPTH 300 M.
START TIME 26/10/1985 3:40: .0 GMT
FREQUENCY UNIT 0.1%

MOORING LC-3
DEPTH (M) 25

INSTRUMENT	N BROWN ACM2
SERIAL NUMBER	1229
LATITUDE	46 59.04 N
LONGITUDE	47 17.54 W
WATER DEPTH (M)	400
MOORING DATE;CRUISE	25/10/1985 ; 85-930
DURATION (DAYS)	0.00
SAMPLE INTERVAL	20 MINUTES

COMMENTS

THE NEIL BROWN CURRENT METER WAS PIGGY BACKED TO AANDERAA CURRENT METER 5795, BOTH INSTRUMENTS WERE NOT RECOVERED.

MOORING LC-3
DEPTH (M) 50

INSTRUMENT TYPE	AANDERAA RCM
SERIAL NUMBER	6408
LATITUDE	46 59.69 N
LONGITUDE	47 17.52 W
WATER DEPTH (M)	400
MOORING DATE ; CRUISE	25/10/1985 ; 85-930
DURATION (DAYS)	54.92
SAMPLE INTERVAL	20 MINUTES

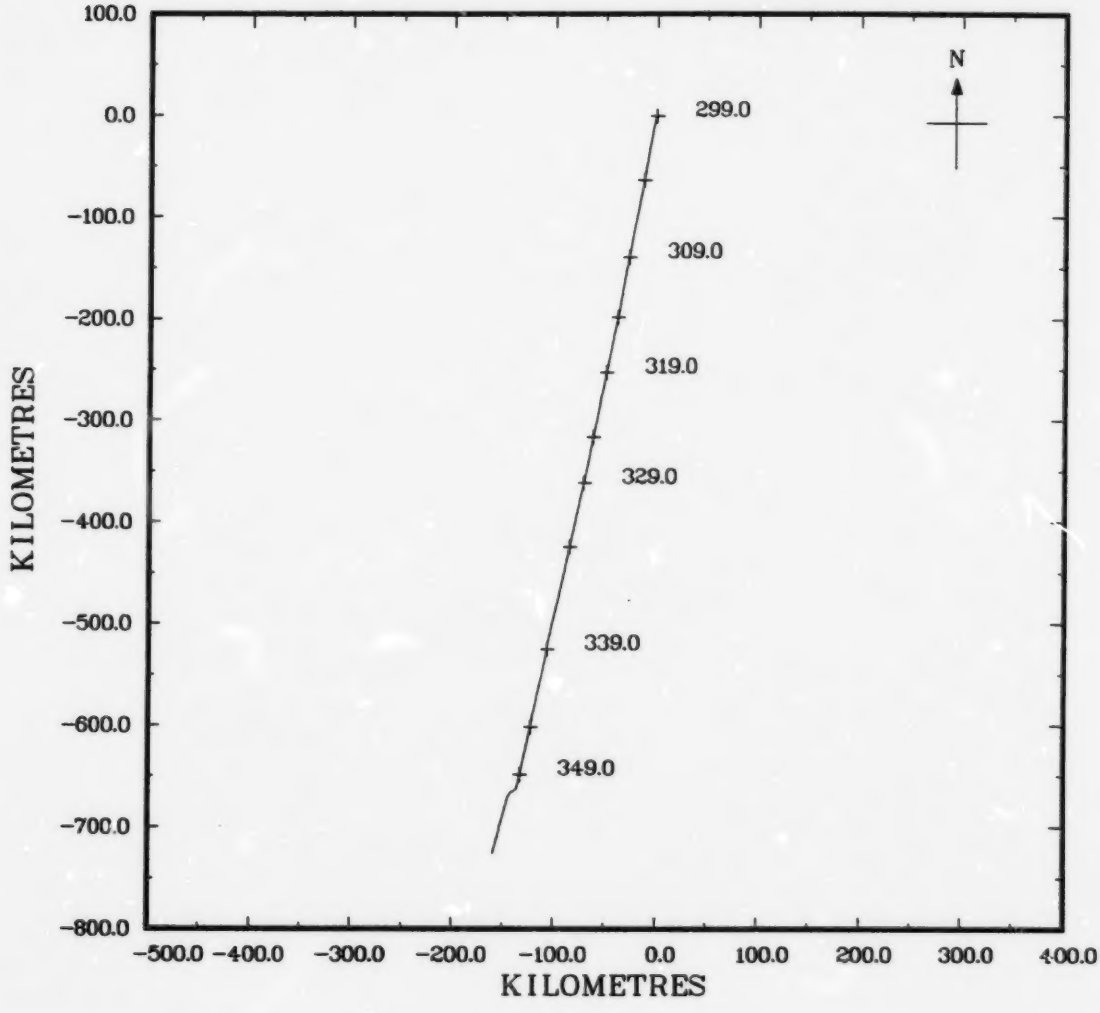
SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
SPEED(M/SEC)	.157	.058	.446	.066	3954
E COMP VEL(M/S)	-.034	-.376	-.006	.025	3954
N COMP VEL(M/S)	-.153	-.411	-.058	.062	3954
TEMPERATURE(DEG.C.)	1.588	-1.551	4.486	1.036	3954
SALINITY	33.764	33.005	34.375	.257	3954
SIGMA-T(KG/M**3)	27.005	26.375	27.531	.218	3954

COMMENTS

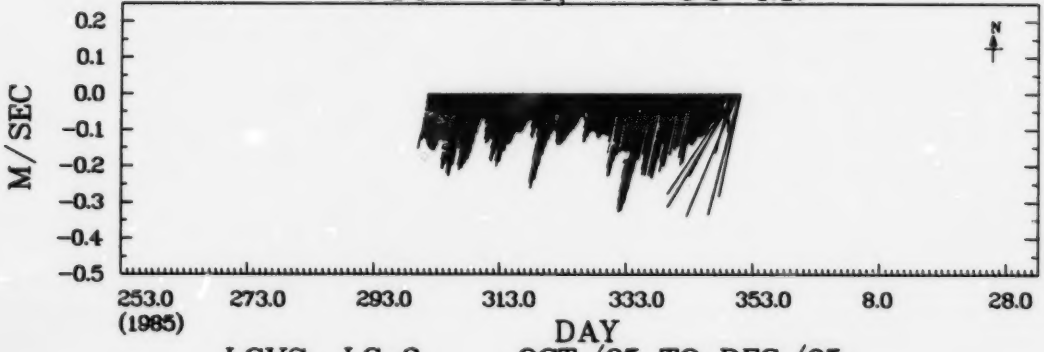
6 HOUR:	SPEED	E COMP VEL	N COMP VEL	TEMPERATURE	SALINITY	SIGMA-T
MEAN	.158	-.033	-.154	1.603	33.770	27.010
STD DEV	.062	.022	.059	.880	.246	.209

MOORING CABLE HOOKED BY FISHING BOAT CAUSING THE MOORING TO GO ADRIFT ON DAY 353 1985.

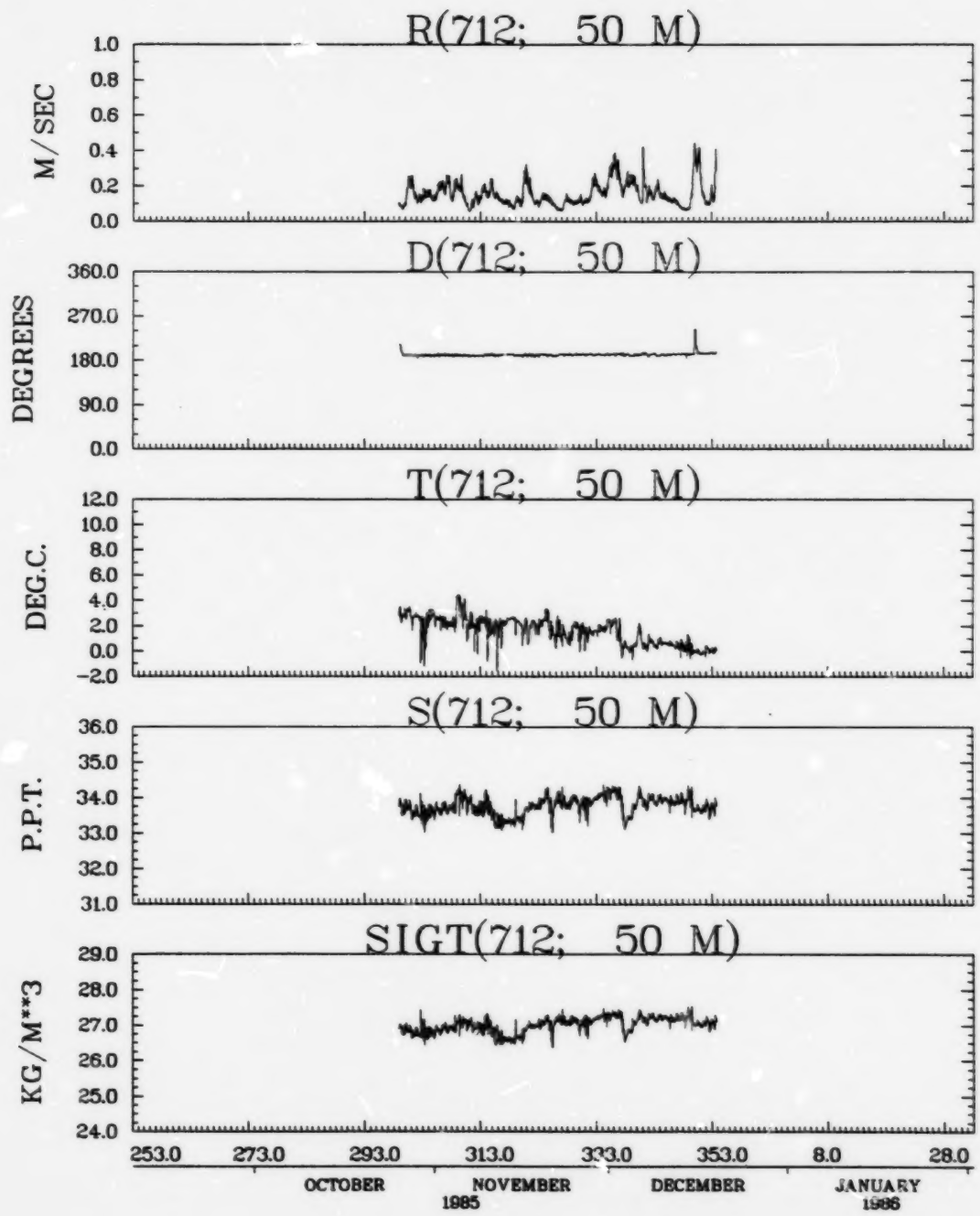
STN. 712, 50 M.



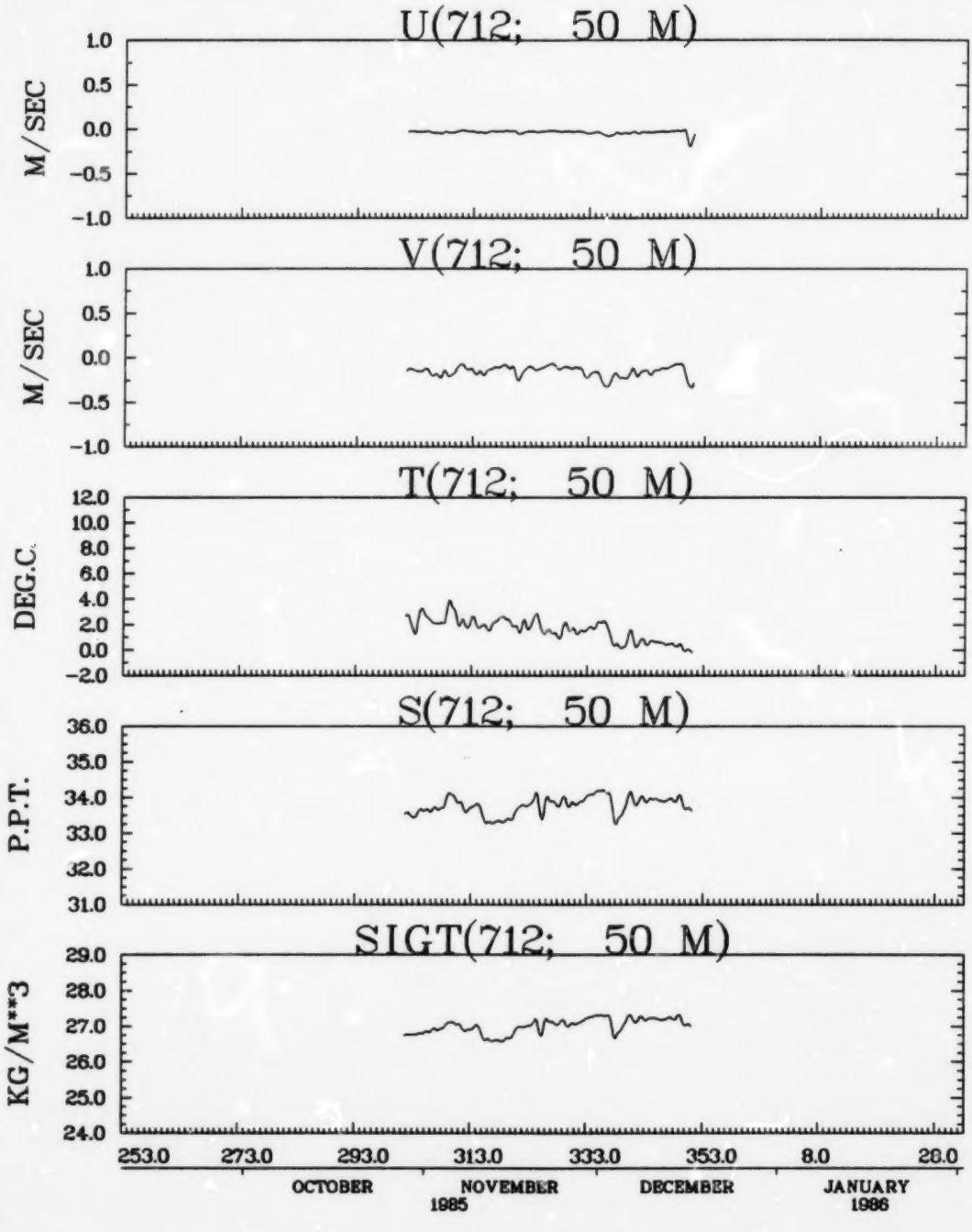
STN. 712, 50 M.



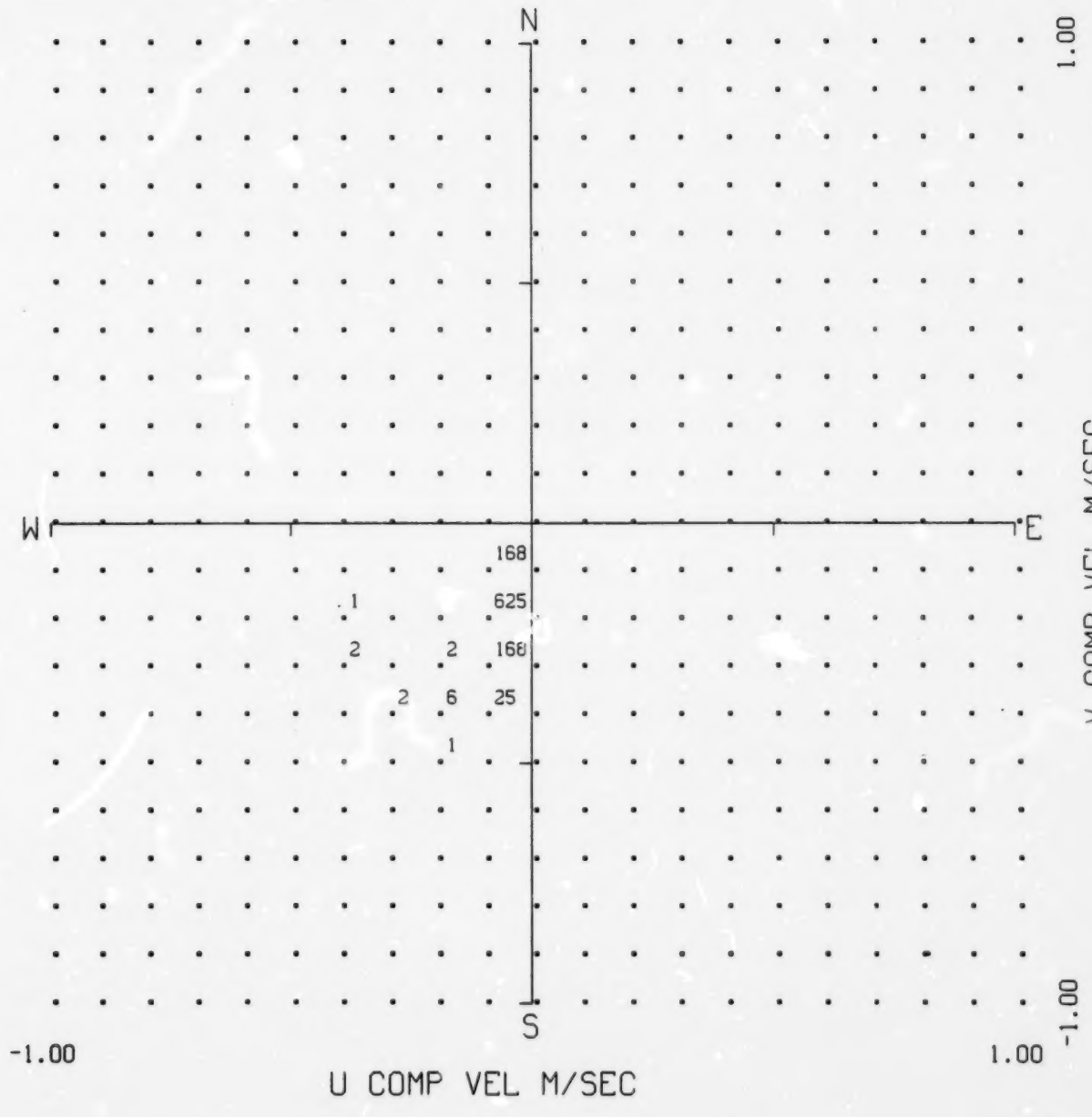
LCVS LC-3 OCT./85 TO DEC./85



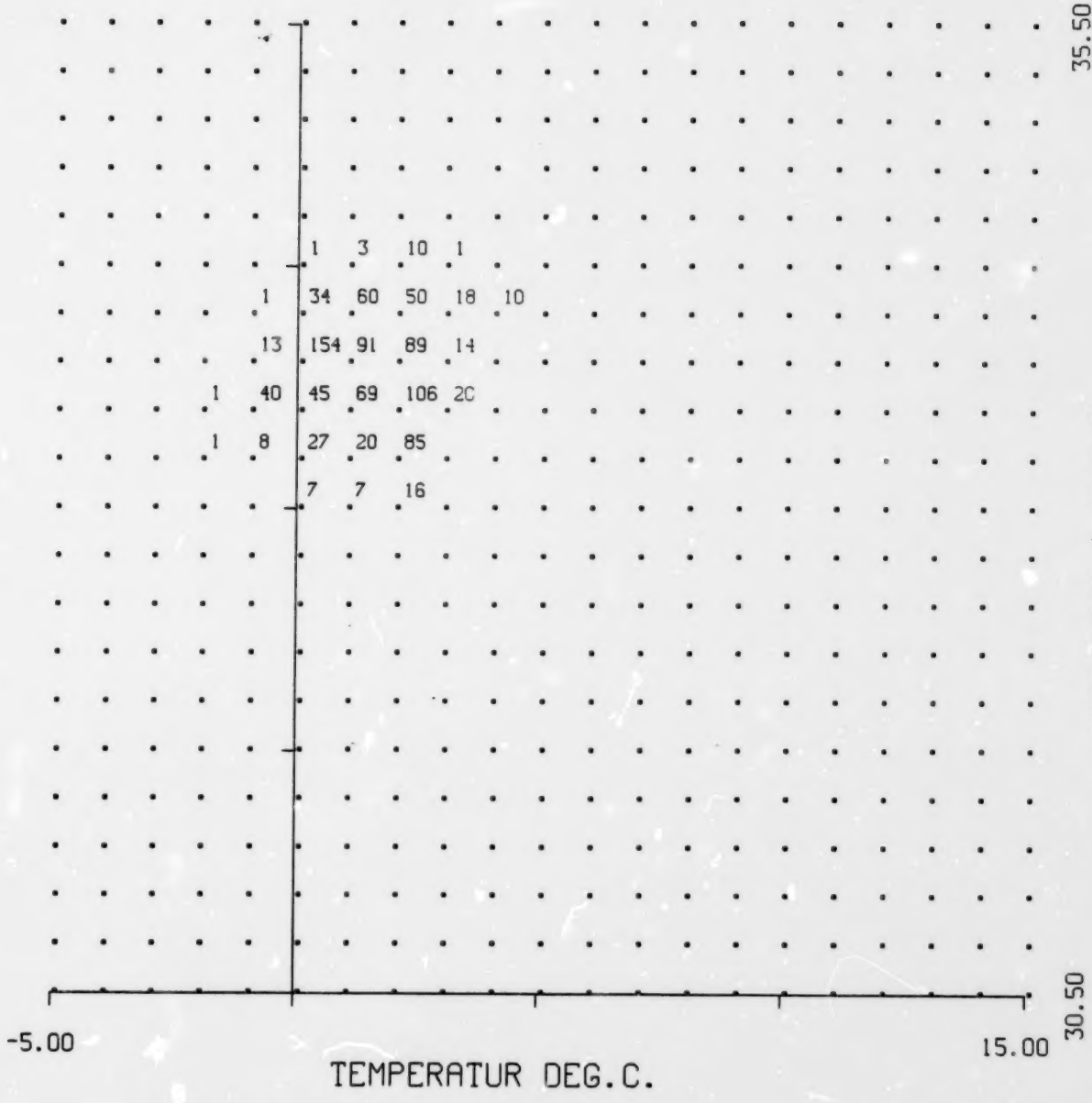
LCVS STATION LC-3 DEPTH 50 M.



LCVS STATION LC-3 DEPTH 50 M.



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-3 DEPTH 50 M.
START TIME 25/10/1985 21:39:55.5 GMT
FREQUENCY UNIT 0.1%



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-3 DEPTH 50 M.
START TIME 25/10/1985 21:39:55.5 GMT
FREQUENCY UNIT 0.1%

MOORING LC-3
DEPTH (M) 100

INSTRUMENT TYPE	AANDERAA RCM4
SERIAL NUMBER	4200
LATITUDE	46 59.69 N
LONGITUDE	47 17.52 W
WATER DEPTH (M)	400
MOORING DATE ; CRUISE	25/10/1985 ; 85-930
DURATION (DAYS)	98.89
SAMPLE INTERVAL	20 MINUTES

SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
SPEED(M/SEC.)	.394	.106	.865	.110	7120
E COMP VEL(M/S)	.022	-.337	.327	.082	7120
N COMP VEL(M/S)	-.385	-.865	-.106	.112	7120
TEMPERATURE(DEG.C.)	.539	-1.501	3.778	1.003	7120
SALINITY	34.118	33.556	34.850	.196	7120
SIGMA-T(KG/M**3)	27.358	26.865	27.850	.139	7120

COMMENTS
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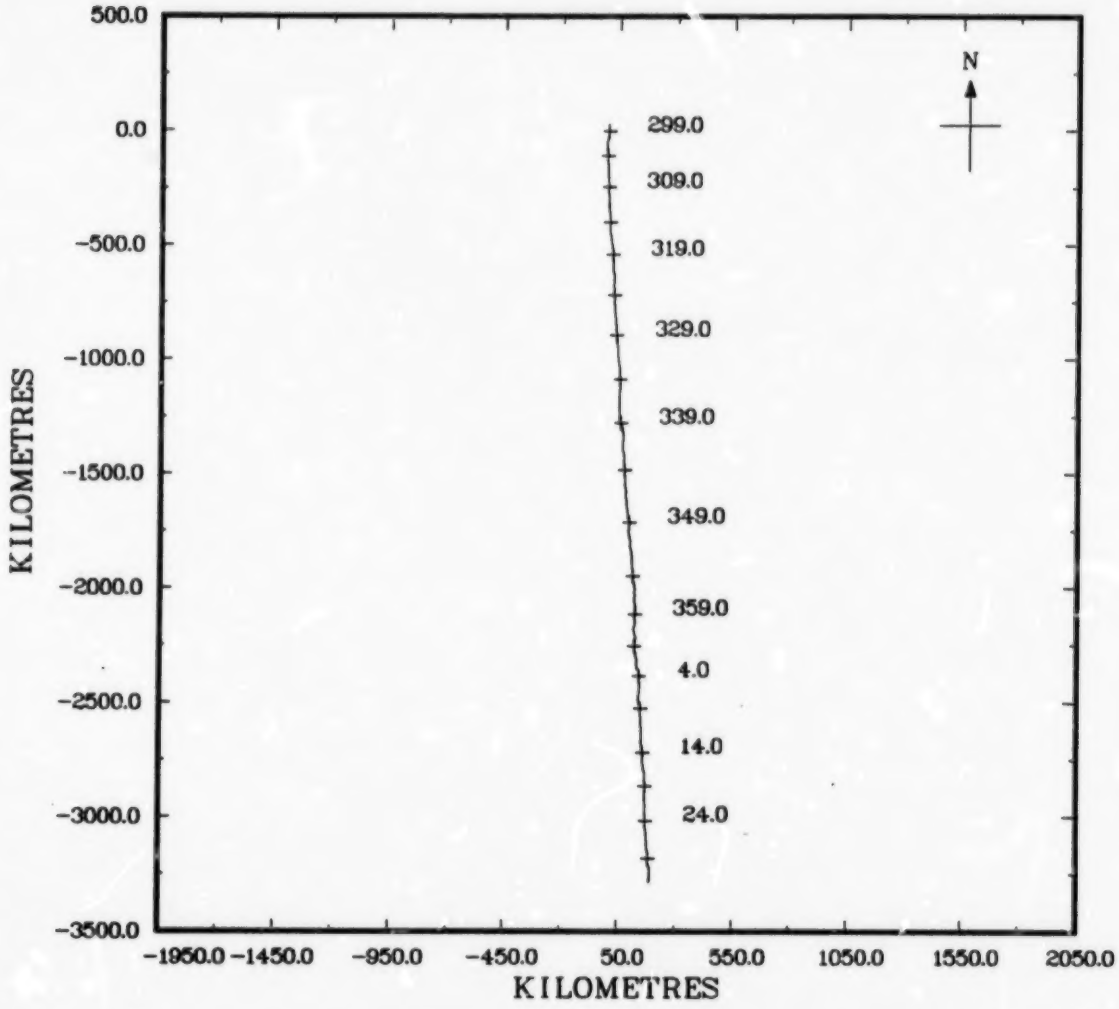
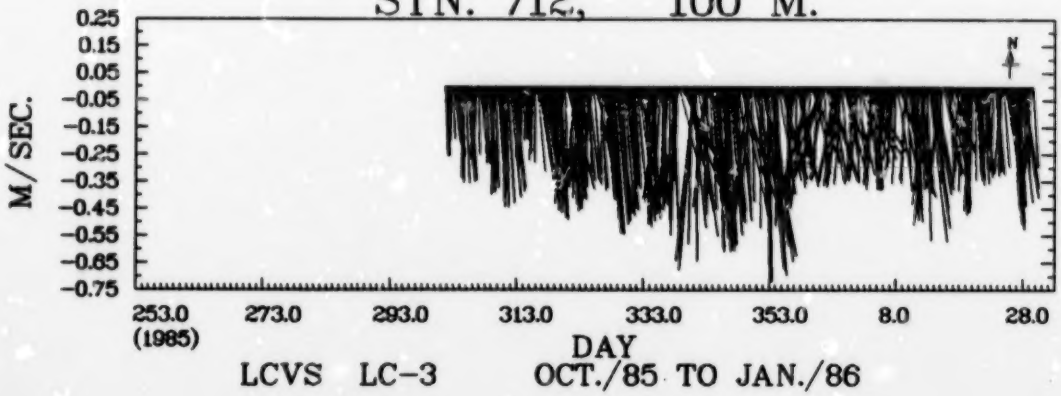
6 HOUR:	SPEED	E COMP VEL	N COMP VEL	TEMPERATURE	SALINITY	SIGMA-T
MEAN	.392	.024	-.389	.565	34.127	27.363
STD DEV	.097	.042	.098	.802	.176	.126

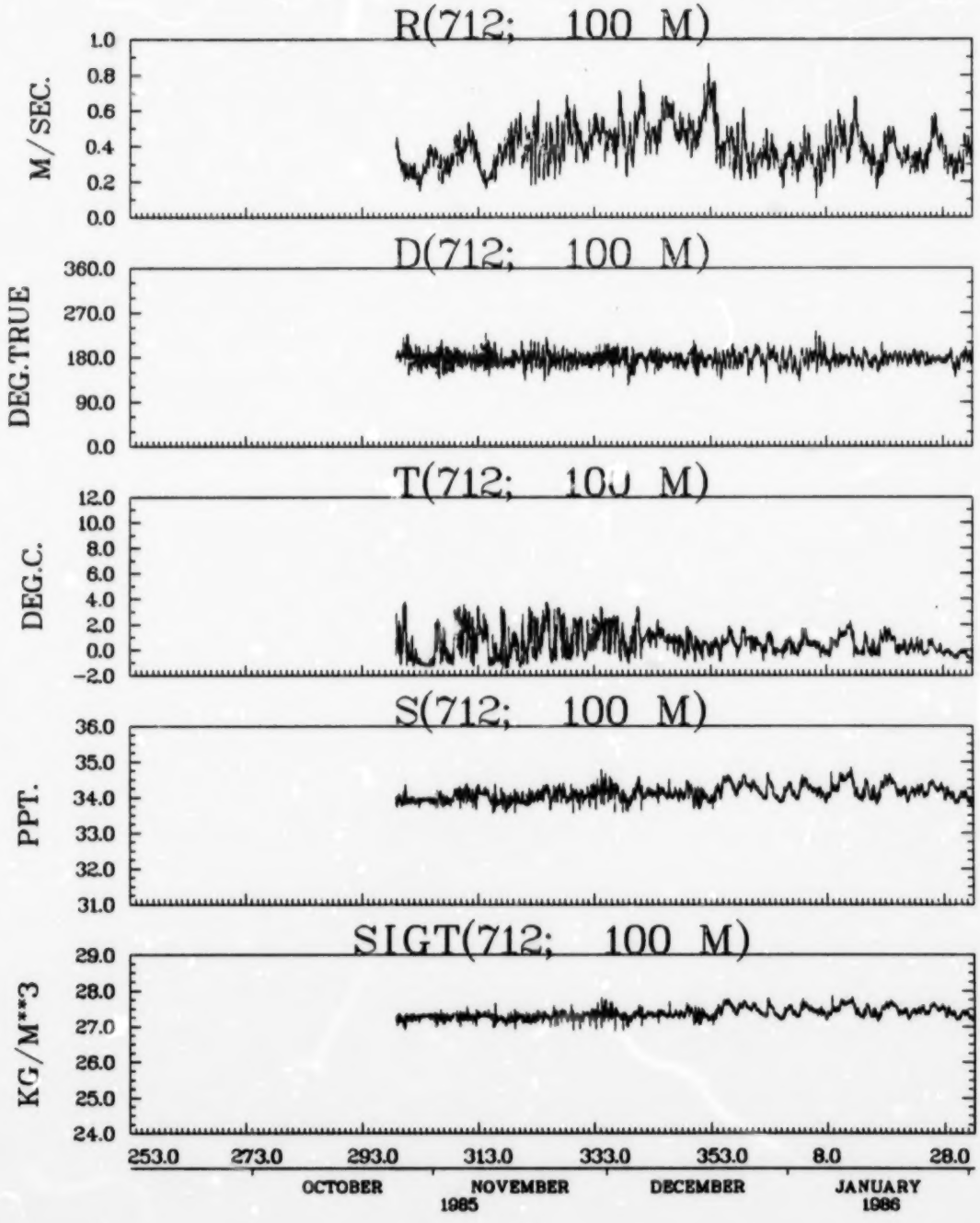
STN. 712, 100 M.



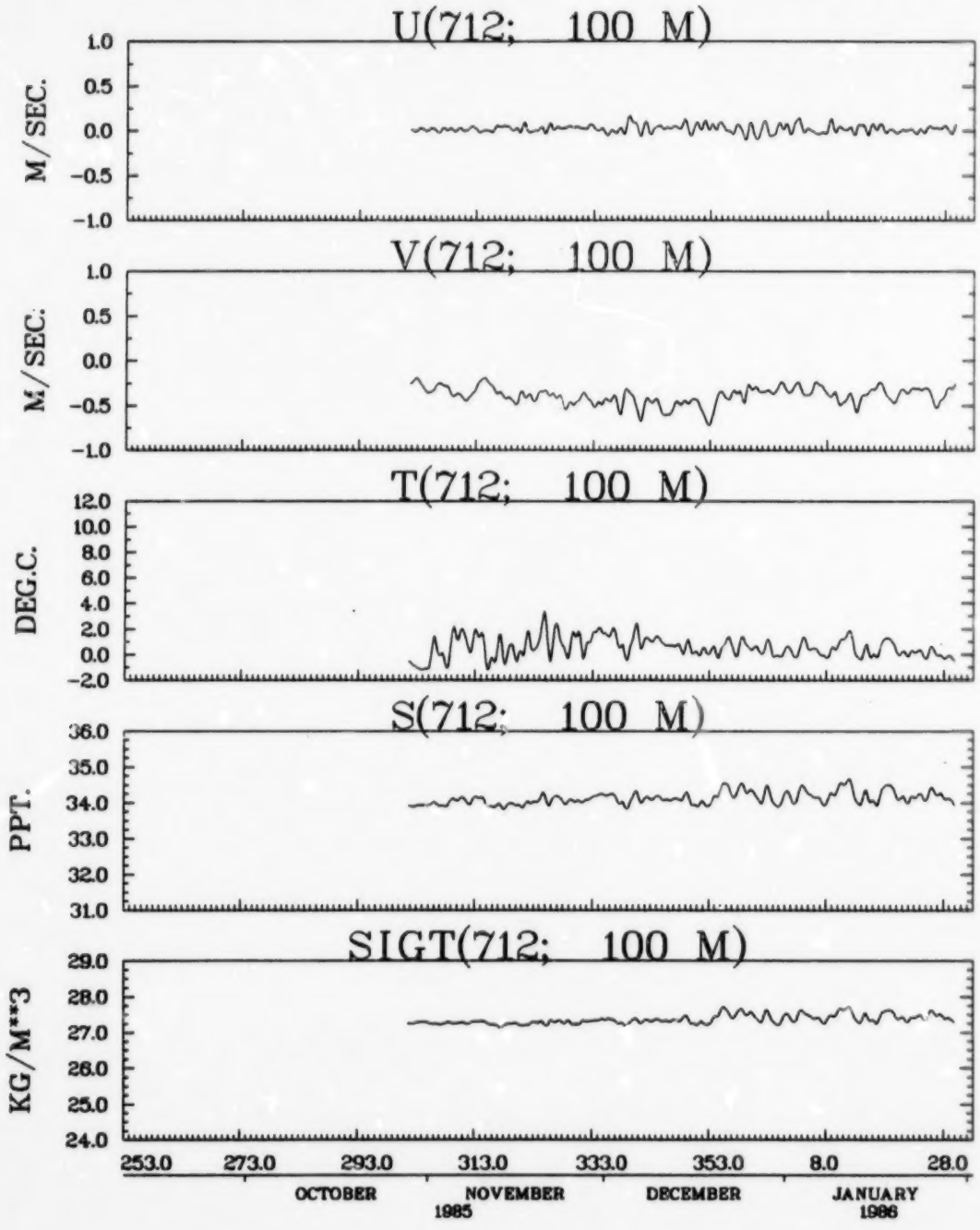
STN. 712, 100 M.



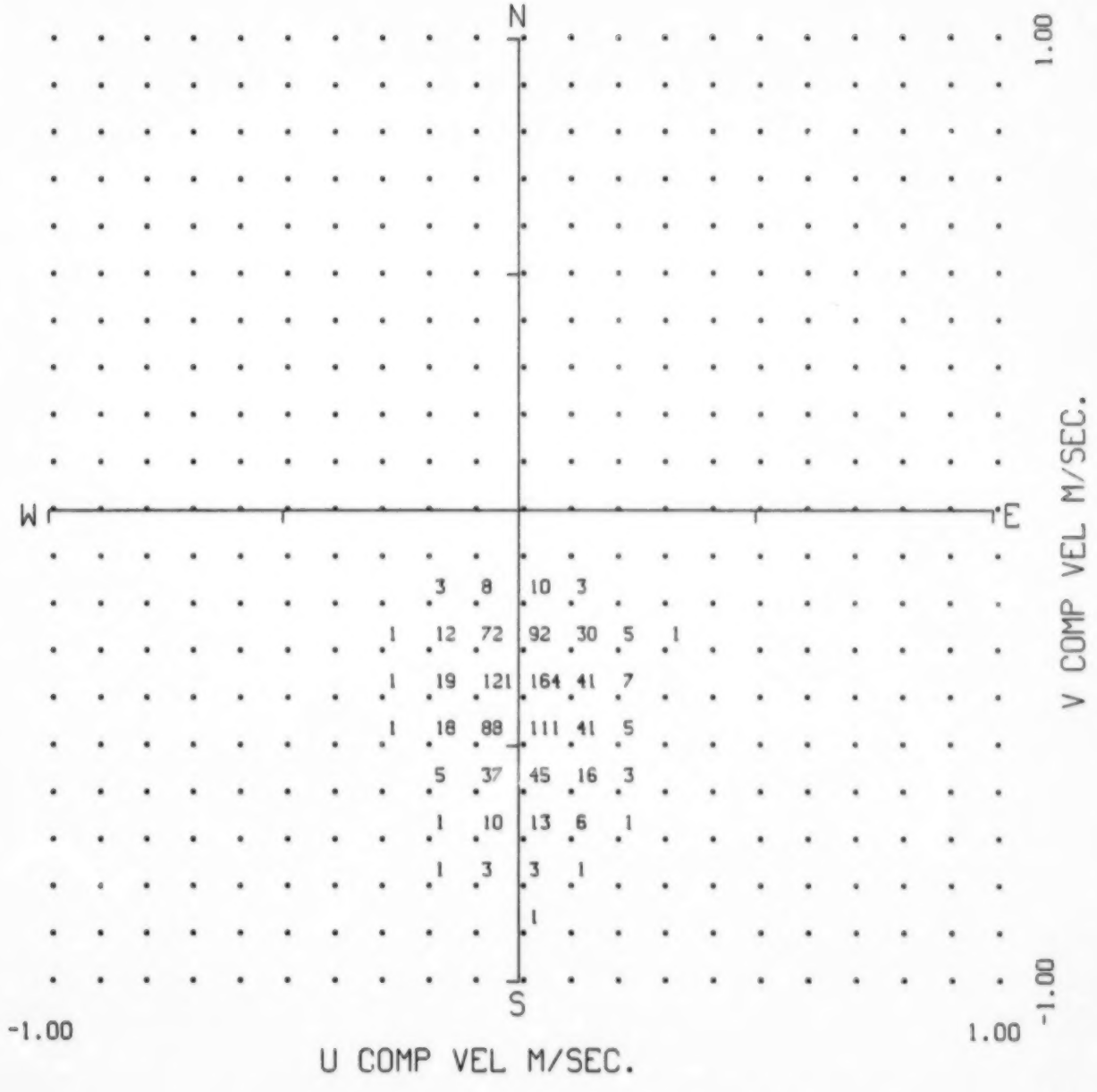
LCVS LC-3 OCT./85 TO JAN./86



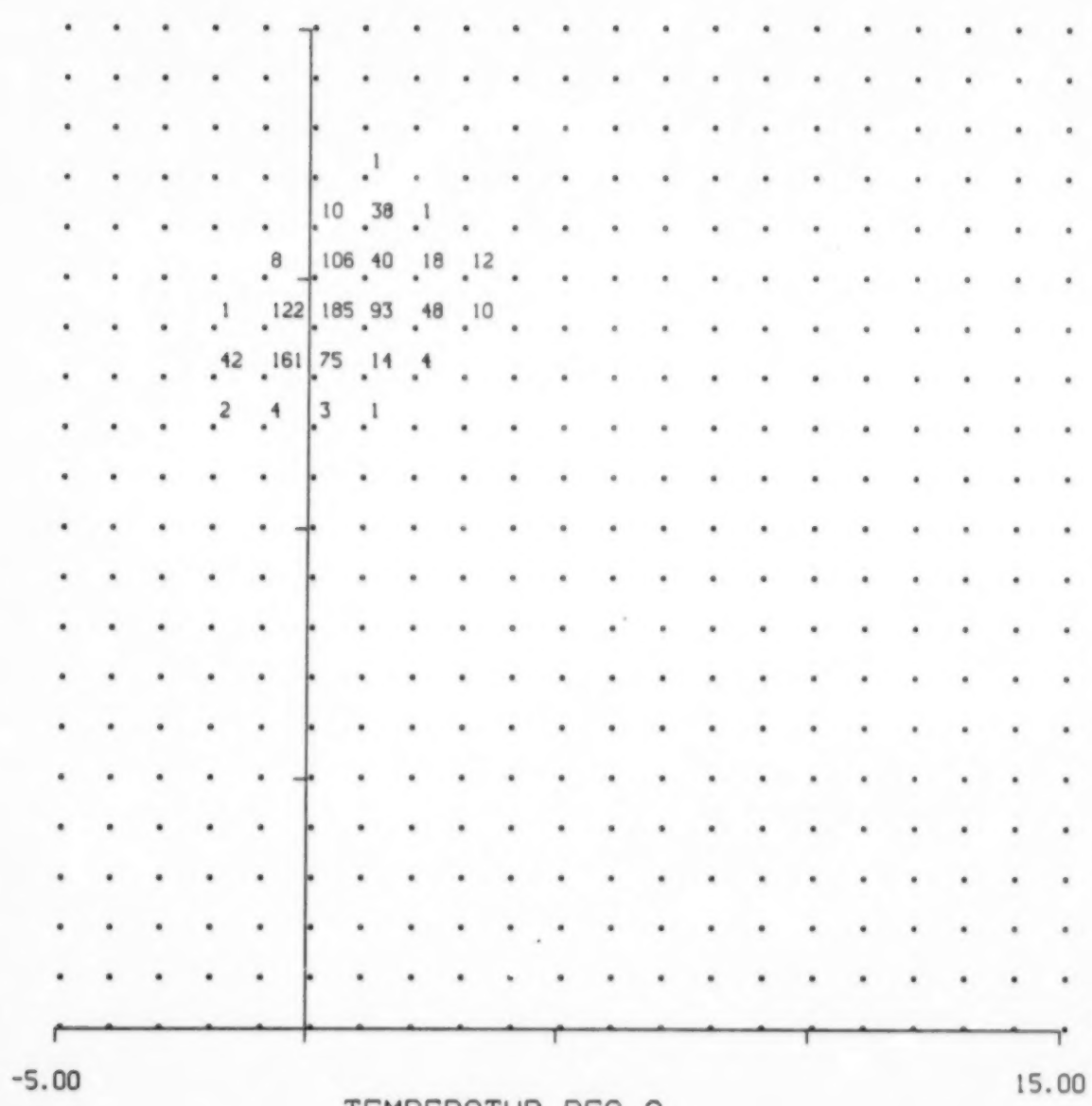
LCVS STATION LC-3 DEPTH 100 M.



LCVS STATION LC-3 DEPTH 100 M.



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-3 DEPTH 100 M.
START TIME 25/10/1985 21:40: .0 GMT
FREQUENCY UNIT 0.1%



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-3 DEPTH 100 M.
START TIME 25/10/1985 21:40: .0 GMT
FREQUENCY UNIT 0.1%

MOORING LC-3
DEPTH (M) 300

INSTRUMENT TYPE	AANDERAA RCM4
SERIAL NUMBER	5573
LATITUDE	46 59.69 N
LONGITUDE	47 17.52 W
WATER DEPTH (M)	400
MOORING DATE ; CRUISE	25/10/1985 ; 85-930
DURATION (DAYS)	98.59
SAMPLE INTERVAL	20 MINUTES

SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
SPEED(M/SEC.)	.281	.015	.617	.120	5279
E COMP VEL(M/S)	.012	-.142	.175	.047	5279
N COMP VEL(M/S)	-.274	-.615	.091	.126	5279
TEMPERATURE(DEG.C.)	1.651	.149	3.379	.539	7120
SALINITY	34.554	34.118	34.962	.126	7120
SIGMA-T(KG/M**3)	27.640	27.299	27.847	.064	7120

COMMENTS
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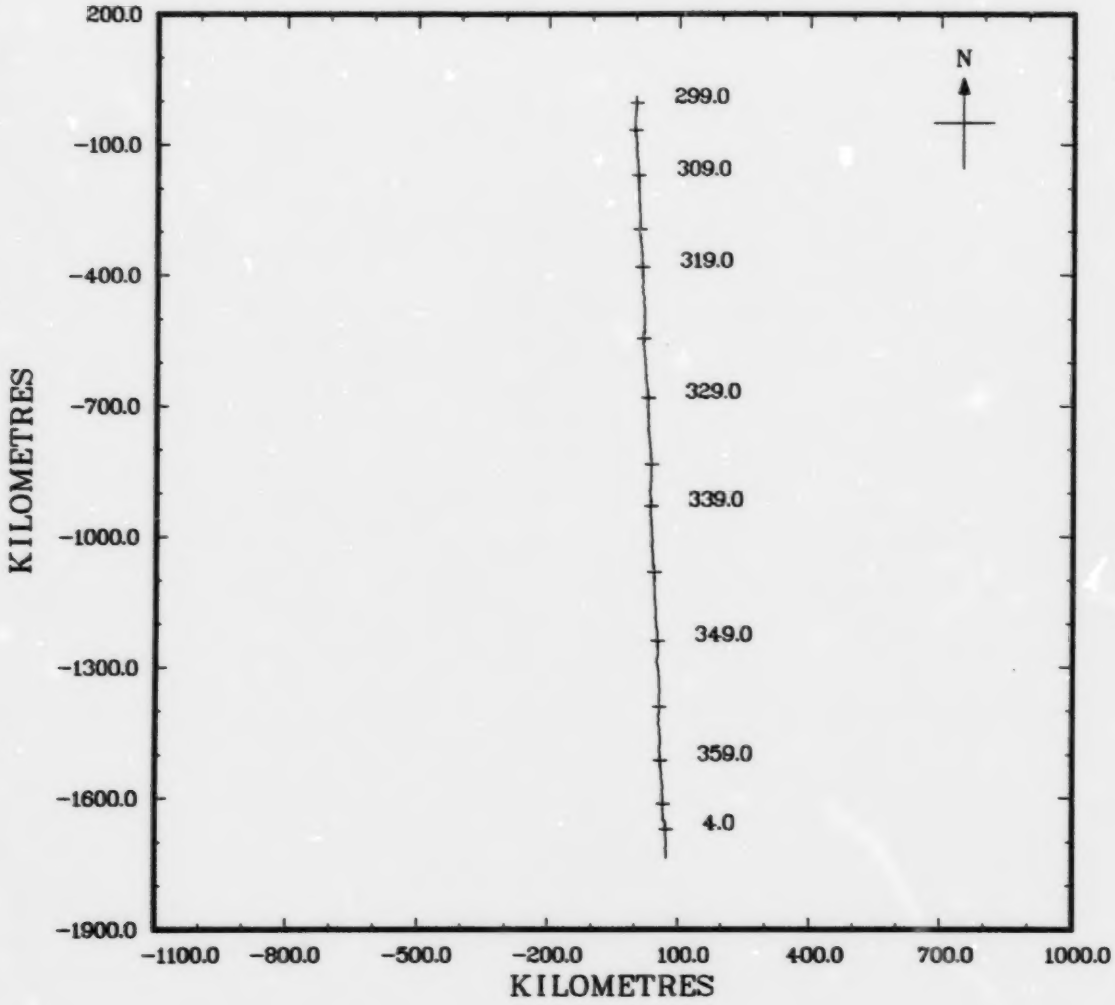
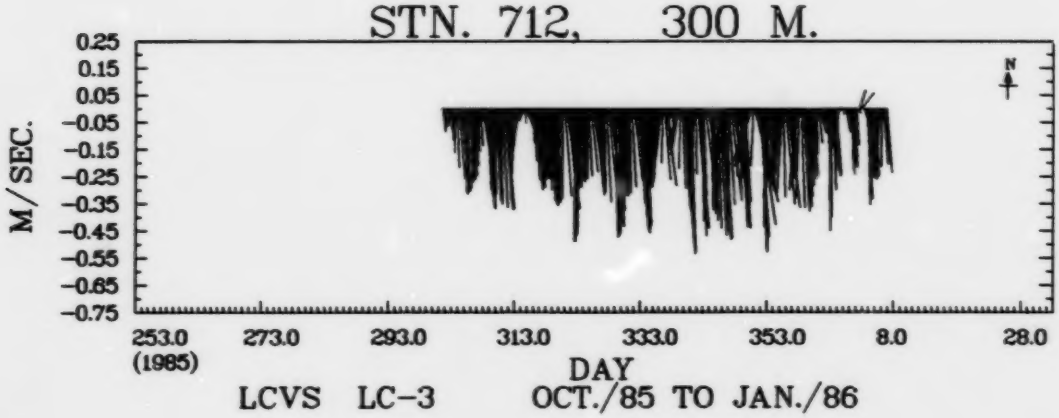
6 HOUR:	SPEED	E COMP VEL	N COMP VEL	TEMPERATURE	SALINITY	SIGMA-T
MEAN	.279	.012	-.277	1.634	34.551	27.639
STD DEV	.115	.020	.117	.517	.120	.059

SPEED FAILED AFTER DAY 7, 1986. DIRECTION NOT PLOTTED AFTER DAY 7, 1986, BECAUSE MOBIL SENT DATA AS U & V COMPONENTS.

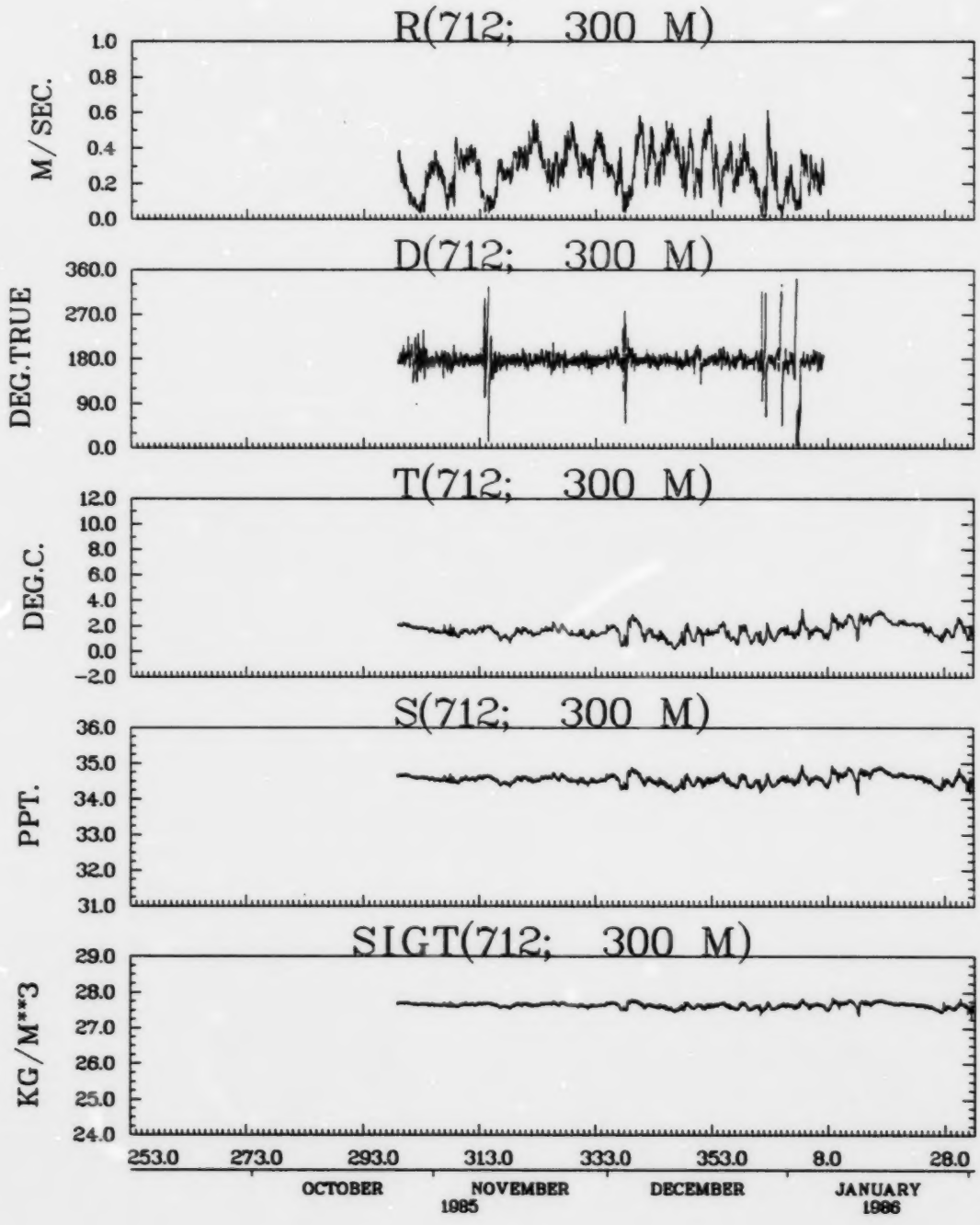
STN. 712, 300 M.



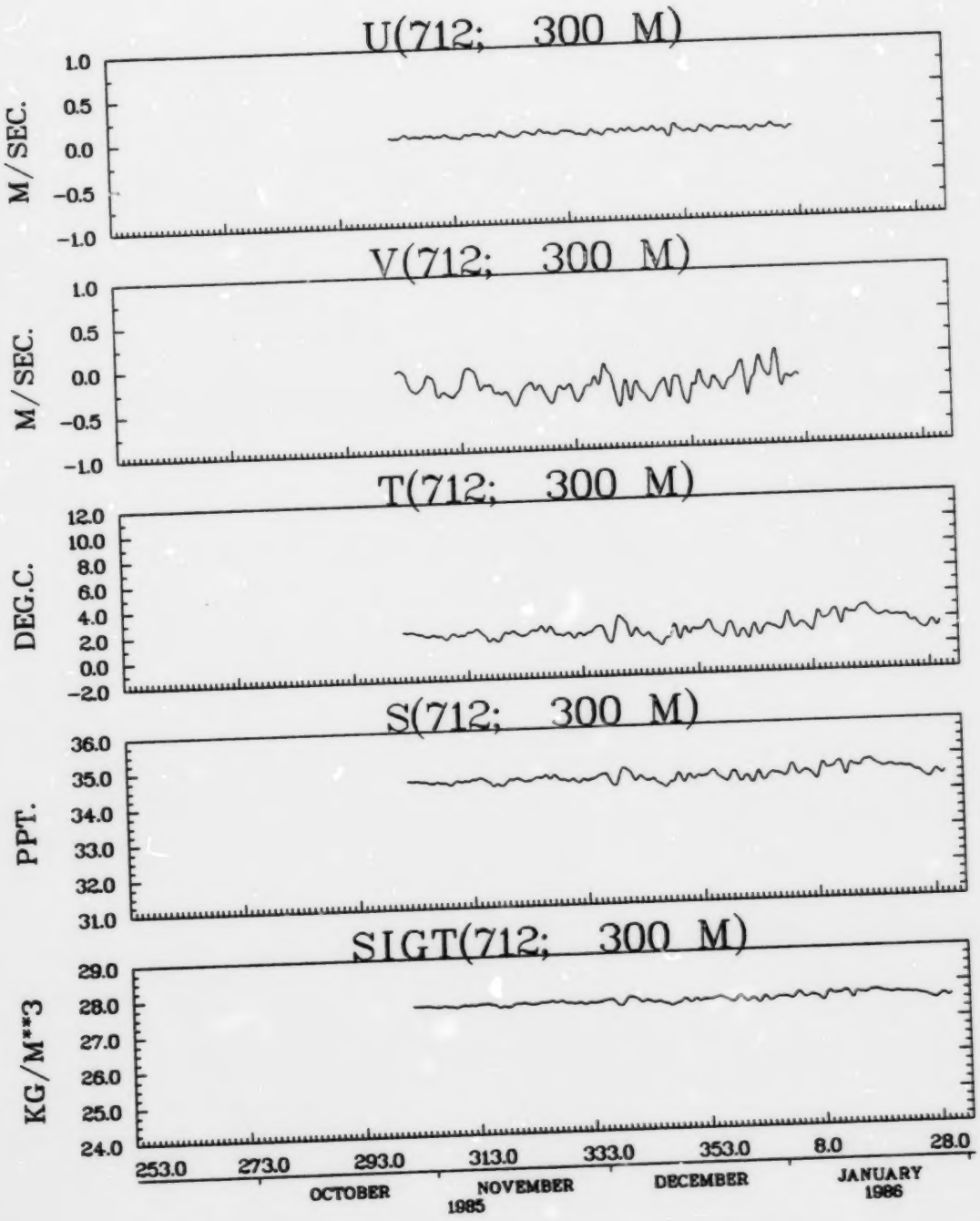
STN. 712, 300 M.



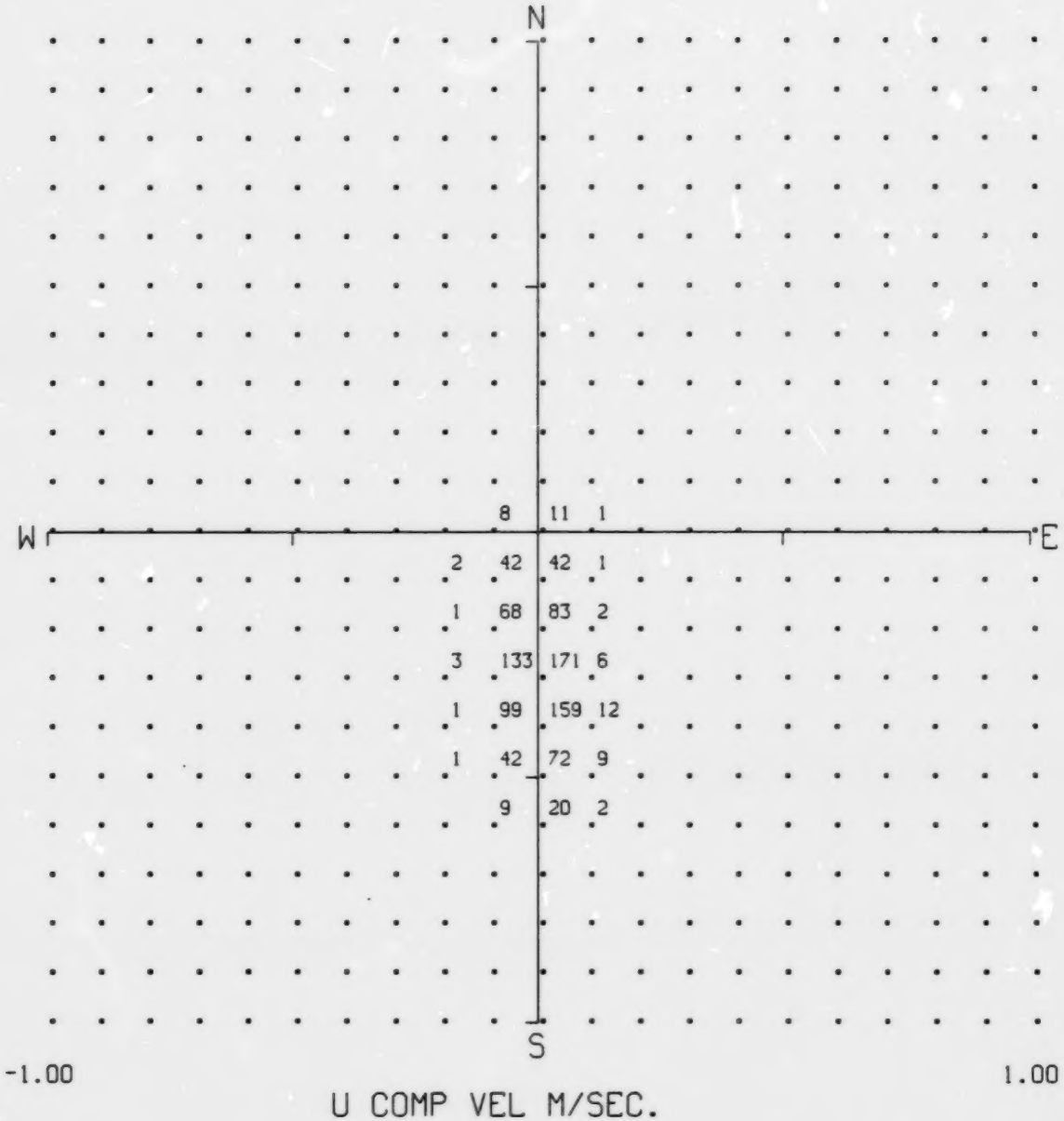
LCVS LC-3 OCT./85 TO JAN./86



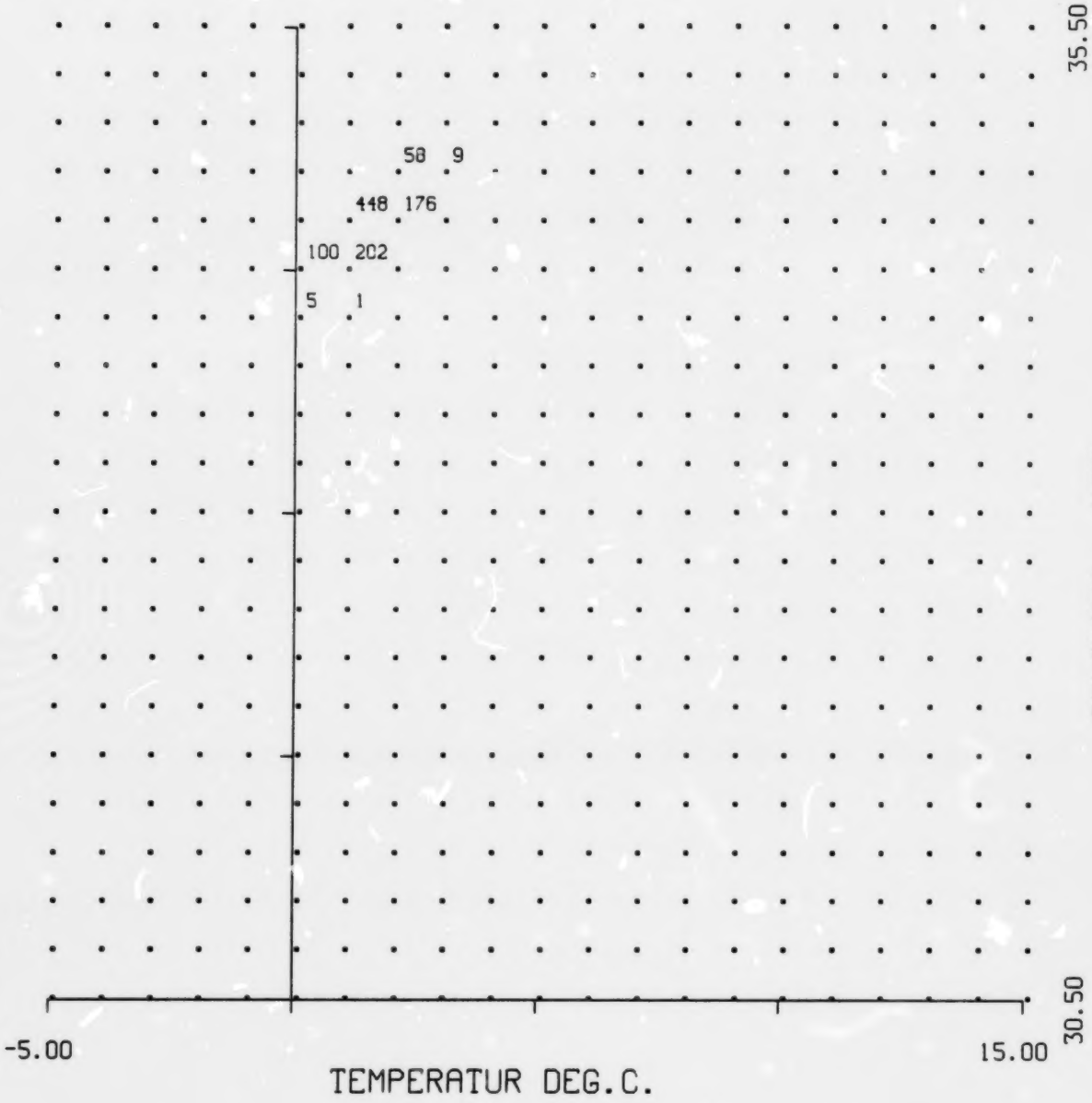
LCVS STATION LC-3 DEPTH 300 M.



LCVS STATION LC-3 DEPTH 300 M.



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-3 DEPTH 300 M.
START TIME 25/10/1985 21:40: .0 GMT
FREQUENCY UNIT 0.1%



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-3 DEPTH 300 M.
START TIME 25/10/1985 21:40: .0 GMT
FREQUENCY UNIT 0.1%

MOORING LC-4
DEPTH (M) 50

INSTRUMENT	AANDERAA RCM4
SERIAL NUMBER	7121
LATITUDE	46 59.01 N
LONGITUDE	47 08.33 W
WATER DEPTH (M)	1000
MOORING DATE;CRUISE	25/10/1985 ; 85-930
DURATION (DAYS)	0.00
SAMPLE INTERVAL	20 MINUTES

COMMENTS

INSTRUMENT NOT RECOVERED.

MOORING LC-4
DEPTH (M) 100

INSTRUMENT	AANDERAA RCM4
SERIAL NUMBER	7130
LATITUDE	46 59.01 N
LONGITUDE	47 08.33 W
WATER DEPTH (M)	1000
MOORING DATE;CRUISE	25/10/1985 ; 85-930
DURATION (DAYS)	0.00
SAMPLE INTERVAL	20 MINUTES

COMMENTS

INSTRUMENT NOT RECOVERED.

MOORING LC-4
DEPTH (M) 300

INSTRUMENT	AANDERAA RCM4
SERIAL NUMBER	2662
LATITUDE	46 59.01 N
LONGITUDE	47 08.33 W
WATER DEPTH (M)	1000
MOORING DATE;CRUISE	25/10/1985 ; 85-930
DURATION (DAYS)	0.00
SAMPLE INTERVAL	20 MINUTES

COMMENTS

INSTRUMENT NOT RECOVERED.

MOORING LC-4
DEPTH (M) 500

INSTRUMENT	AANDERAA RCM4
SERIAL NUMBER	4344
LATITUDE	46 59.01 N
LONGITUDE	47 08.33 W
WATER DEPTH (M)	1000
MOORING DATE;CRUISE	25/10/1985 ; 85-930
DURATION (DAYS)	0.00
SAMPLE INTERVAL	20 MINUTES

COMMENTS

INSTRUMENT NOT RECOVERED

MOORING LC-4
DEPTH (M) 100

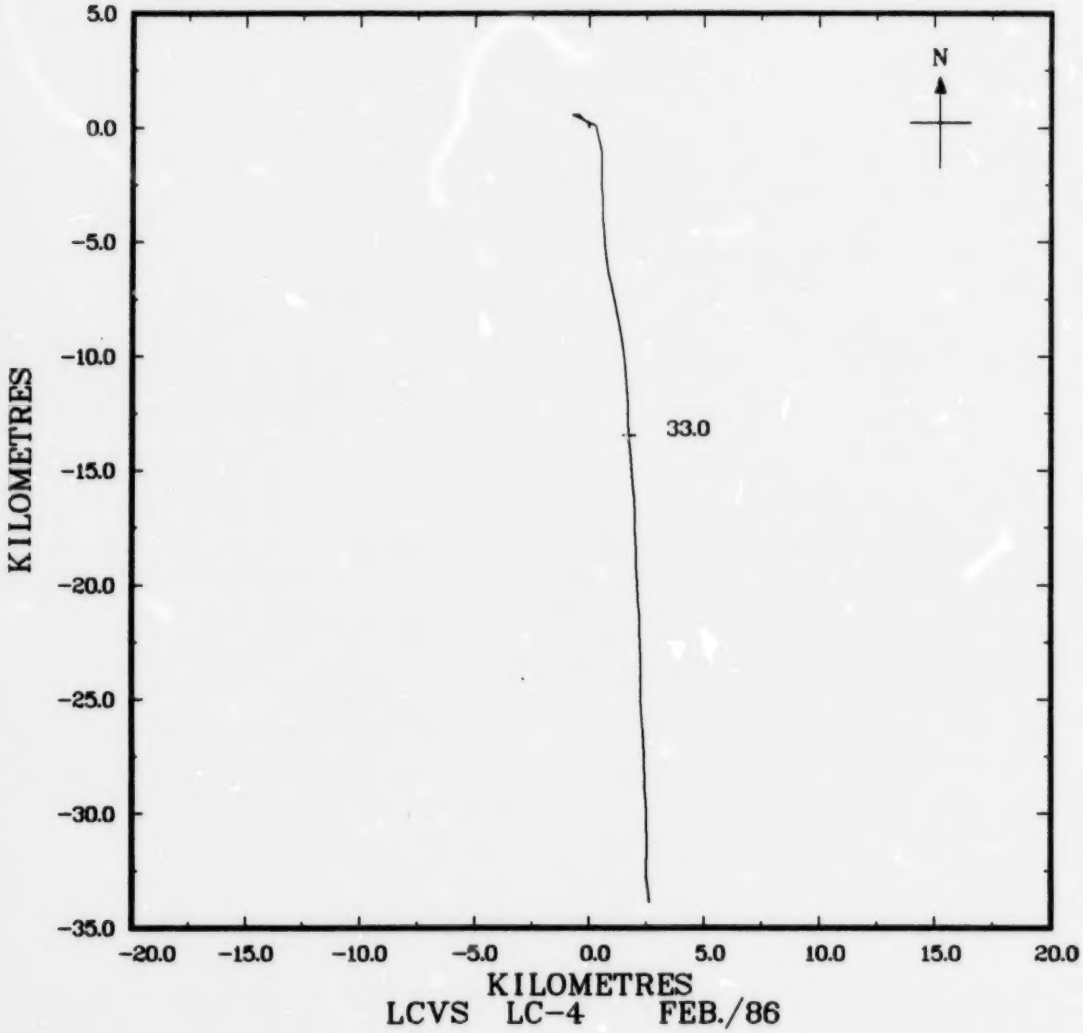
INSTRUMENT TYPE	AANDERAA RCM4
SERIAL NUMBER	5578
LATITUDE	46 59.01 N
LONGITUDE	47 8.33 W
WATER DEPTH (M)	1000
MOORING DATE ; CRUISE	01/02/1986 ; 85-930
DURATION (DAYS)	1.00
SAMPLE INTERVAL	20 MINUTES

SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
SPEED(M/SEC.)	.423	.015	.968	.203	72
E COMP VEL(M/S)	.031	-.419	.507	.097	72
N COMP VEL(M/S)	-.392	-.943	.403	.236	72

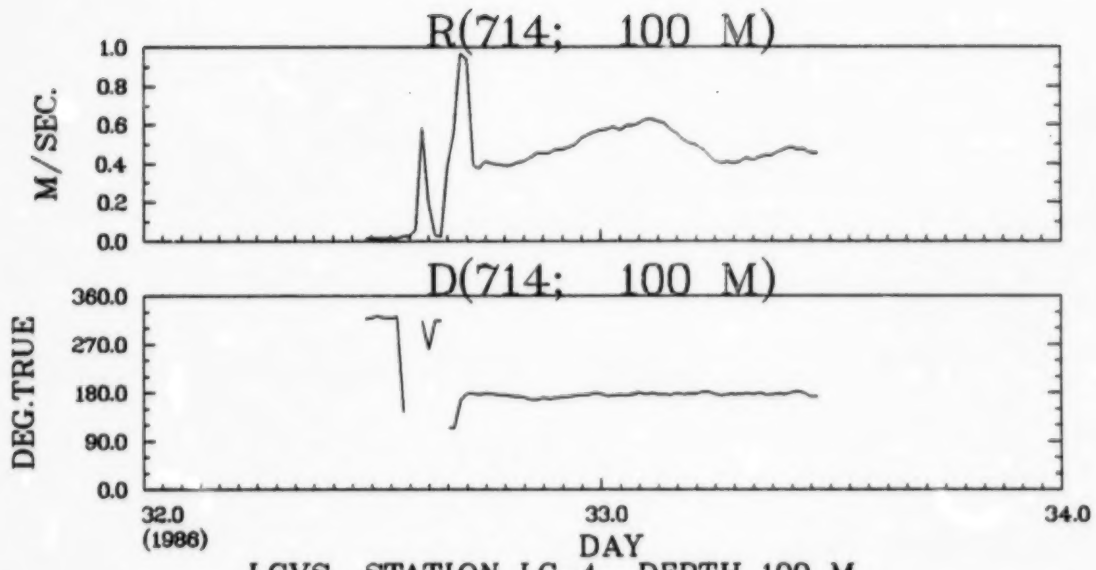
COMMENTS

ORIGINAL MOORING WAS LOST (PRESUMED HOOKED BY FISHING BOAT).
RE-DEPLOYED FOR 1 DAY AT LC-4 SITE (WITHOUT PRESSURE TEMPERATURE OR CONDUCTIVITY SENSORS).

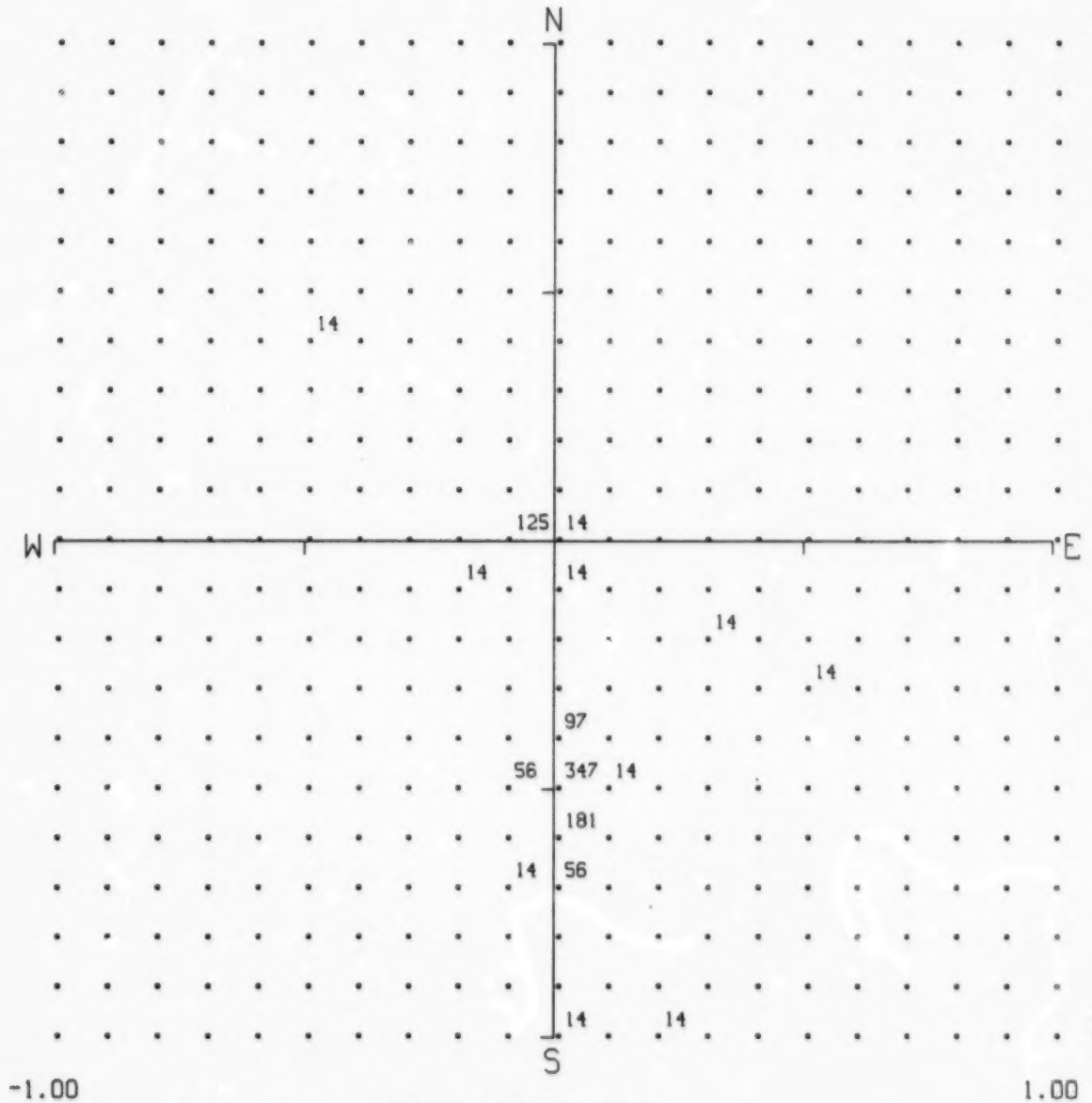
STN. 714, 100 M.



LCVS LC-4 FEB./86



LCVS STATION LC-4 DEPTH 100 M.



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-4 DEPTH 100 M.
START TIME 1/ 2/1986 11:40: .0 GMT
FREQUENCY UNIT 0.1%

MOORING LC-4
DEPTH (M) 200

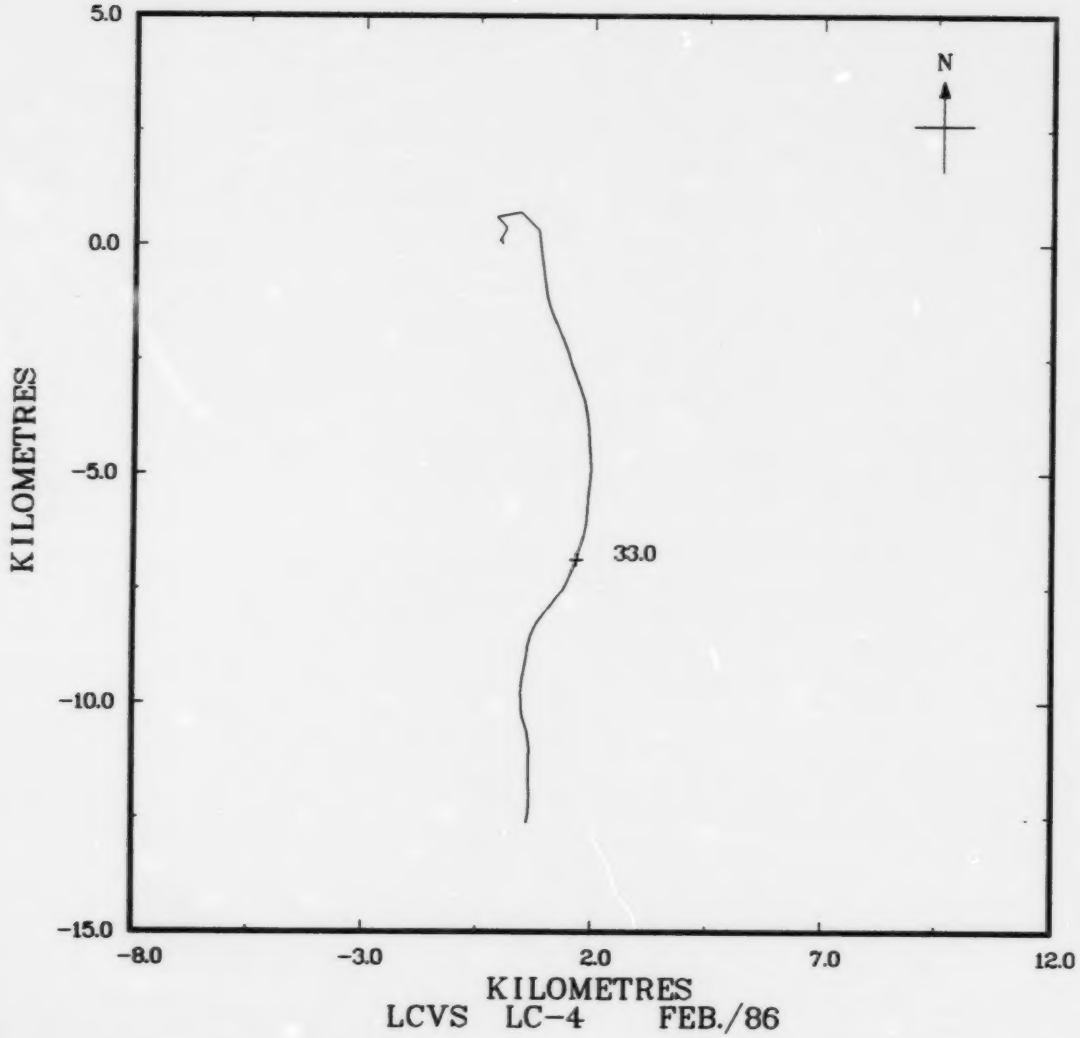
INSTRUMENT TYPE	AANDERAA RCM4
SERIAL NUMBER	6400
LATITUDE	46 59.01 N
LONGITUDE	47 8.33 W
WATER DEPTH (M)	1000
MOORING DATE ; CRUISE	01/02/1986 ; 85-930
DURATION (DAYS)	1.00
SAMPLE INTERVAL	20 MINUTES

SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
SPEED(M/SEC.)	.178	.015	.765	.117	72
E COMP VEL(M/S)	.007	-.133	.431	.083	72
N COMP VEL(M/S)	-.146	-.761	.197	.131	72

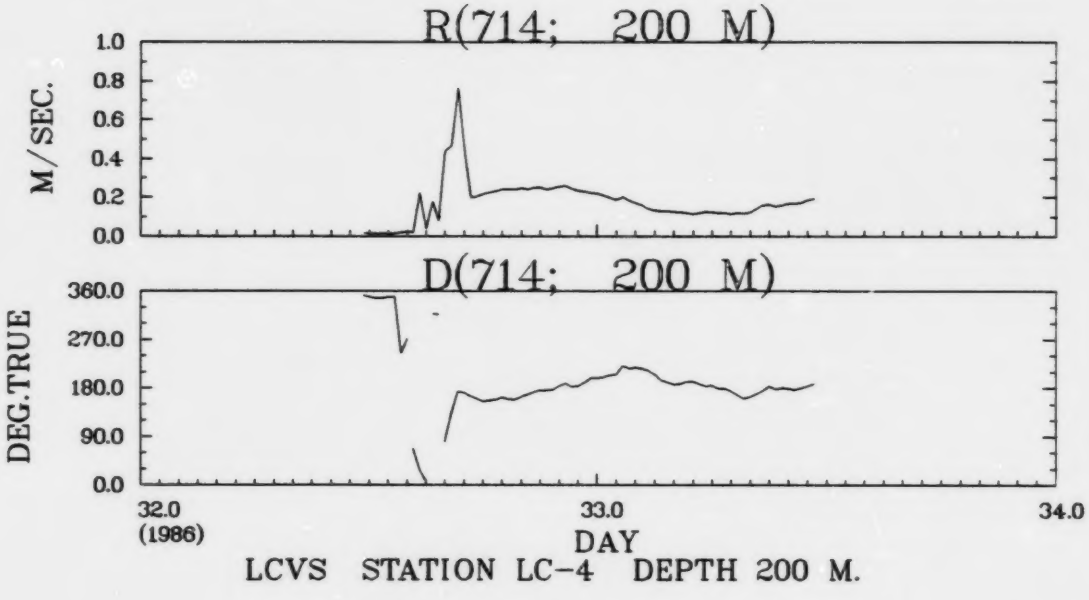
COMMENTS

ORIGINAL MOORING WAS LOST (PRESUMED HOOKED BY FISHING BOAT).
RE-DEPLOYED FOR 1 DAY AT LC-4 SITE (WITHOUT PRESSURE TEMPERATURE OR CONDUCTIVITY SENSORS).

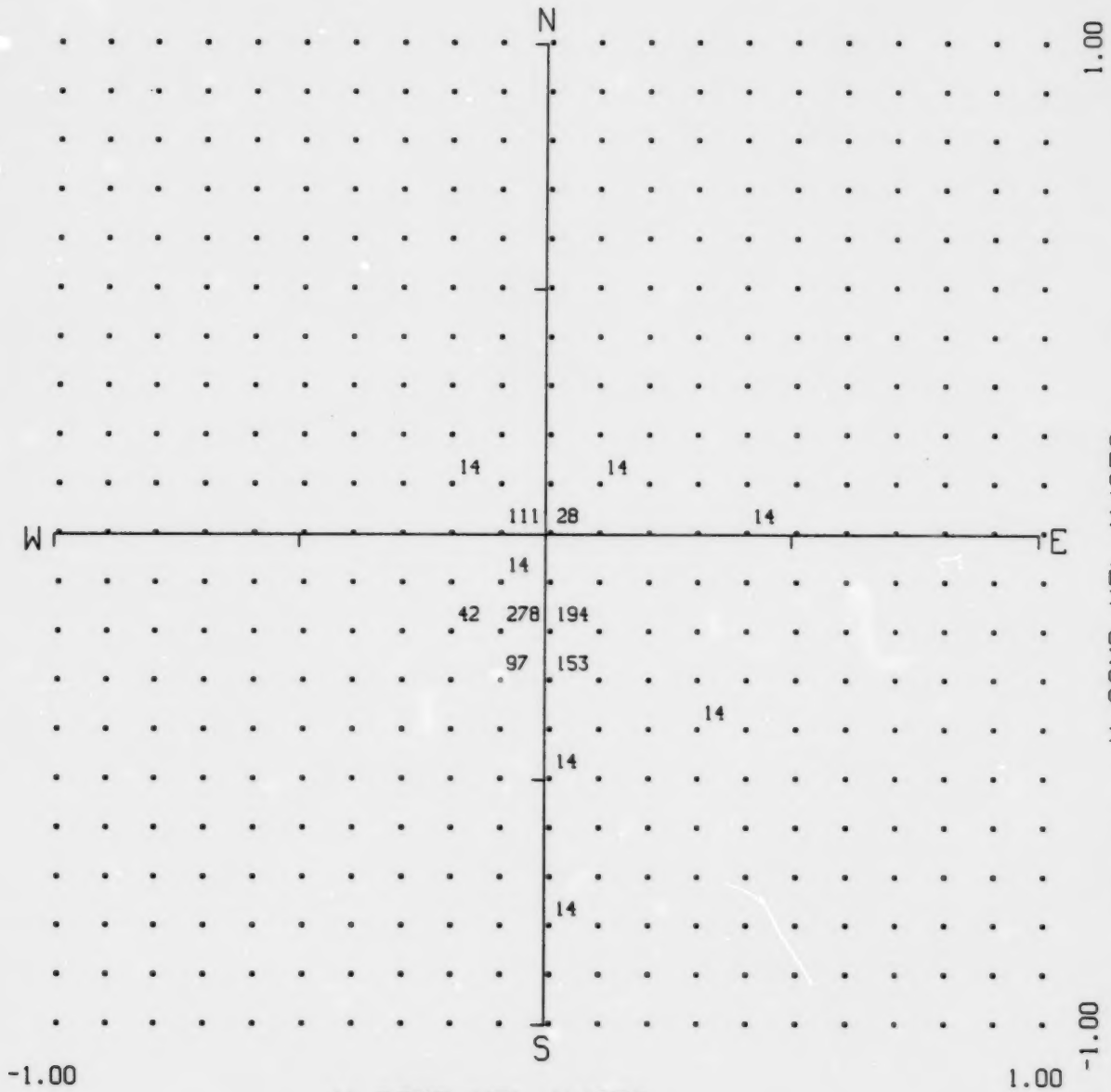
STN. 714, 200 M.



LCVS LC-4 FEB./86



LCVS STATION LC-4 DEPTH 200 M.



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-4 DEPTH 200 M.
START TIME 1/ 2/1986 11:40: .0 GMT
FREQUENCY UNIT 0.1%

MOORING LC-4
DEPTH (M) 398

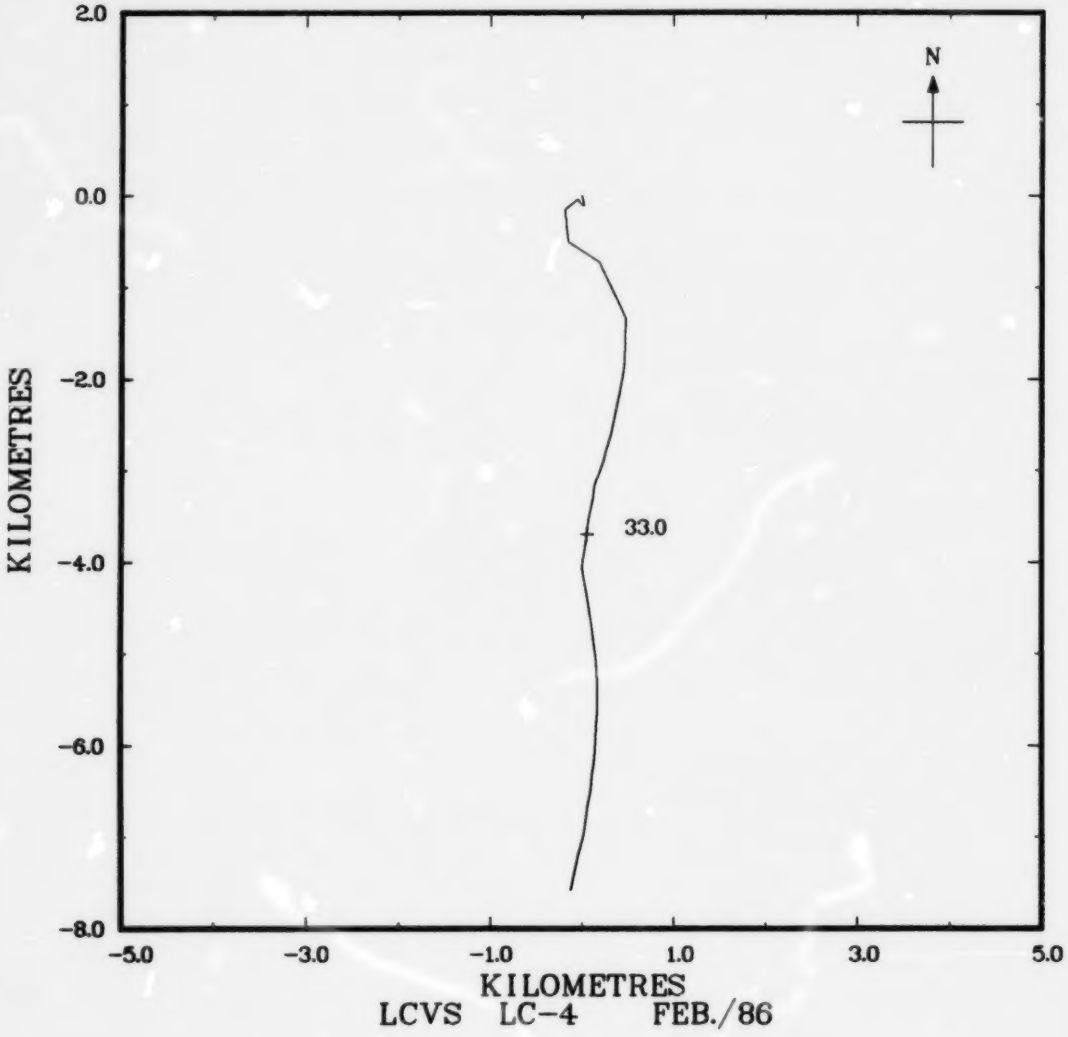
INSTRUMENT TYPE	AANDERAA RCM4
SERIAL NUMBER	4999
LATITUDE	46 59.01 N
LONGITUDE	47 8.33 W
WATER DEPTH (M)	1000
MOORING DATE ; CRUISE	01/02/1986 ; 85-930
DURATION (DAYS)	1.00
SAMPLE INTERVAL	20 MINUTES

SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
SPEED(M/SEC.)	.094	.015	.564	.081	72
E COMP VEL(M/S)	-.001	-.102	.284	.048	72
N COMP VEL(M/S)	-.088	-.510	.042	.074	72

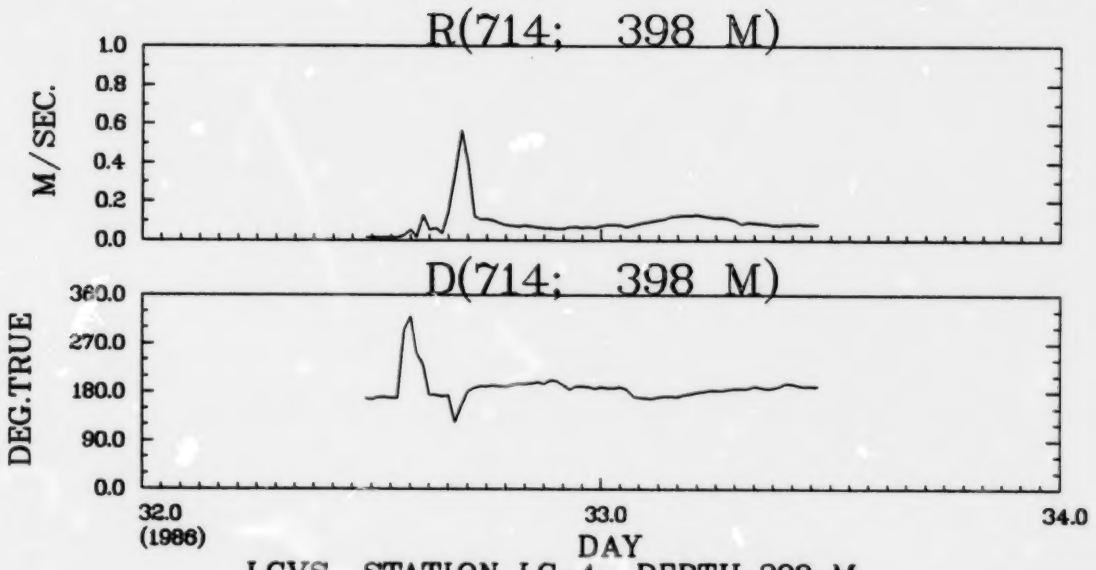
COMMENTS

ORIGINAL MOORING WAS LOST (PRESUMED HOOKED BY FISHING BOAT).
RE-DEPLOYED FOR 1 DAY AT LC-4 SITE (WITHOUT PRESSURE TEMPERATURE OR CONDUCTIVITY SENSORS).

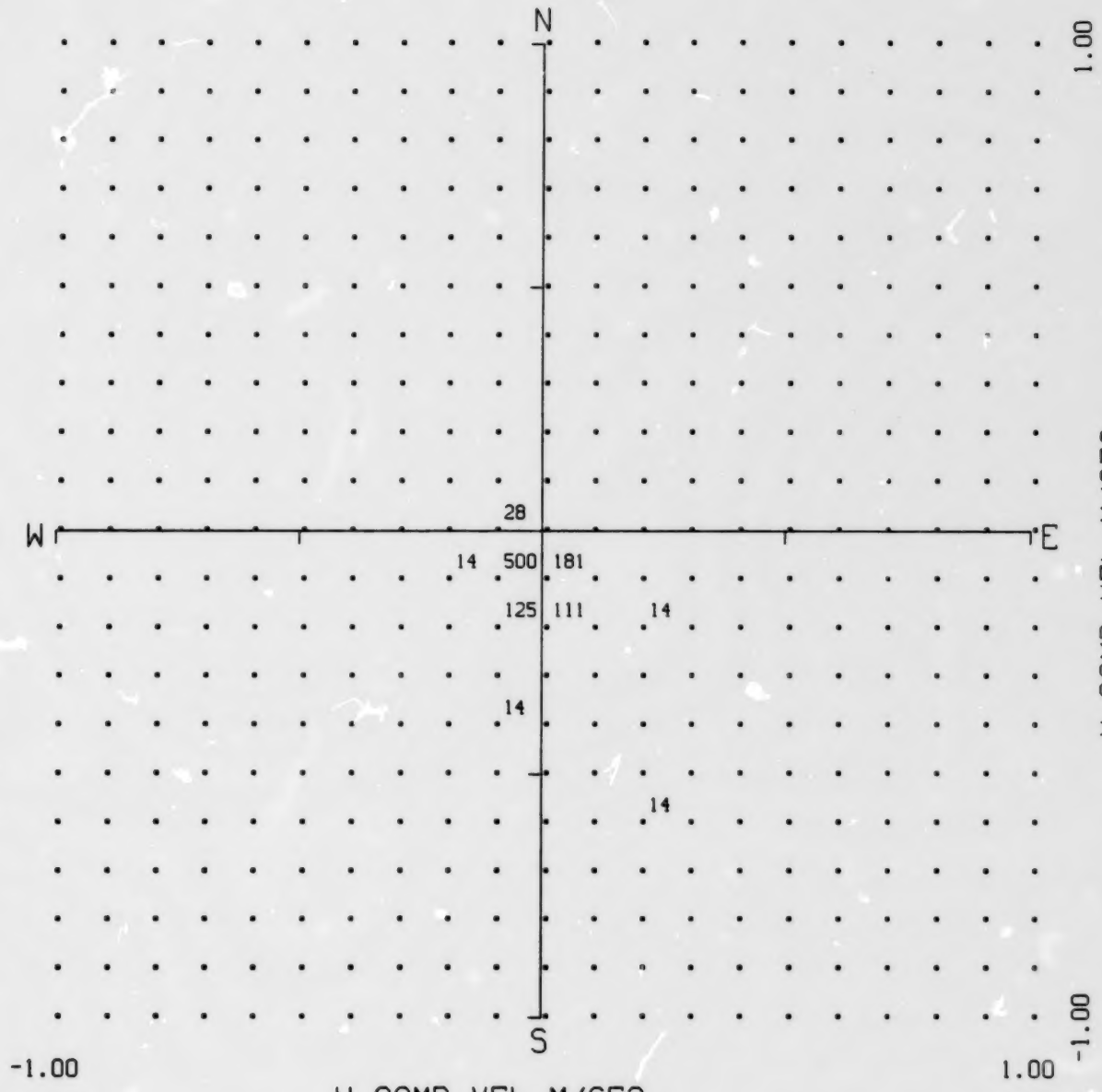
STN. 714, 398 M.



LCVS LC-4 FEB./86



LCVS STATION LC-4 DEPTH 398 M.



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-4 DEPTH 398 M.
START TIME 1/ 2/1986 11:40: .0 GMT
FREQUENCY UNIT 0.1%

MOORING LC-4
DEPTH (M) 950

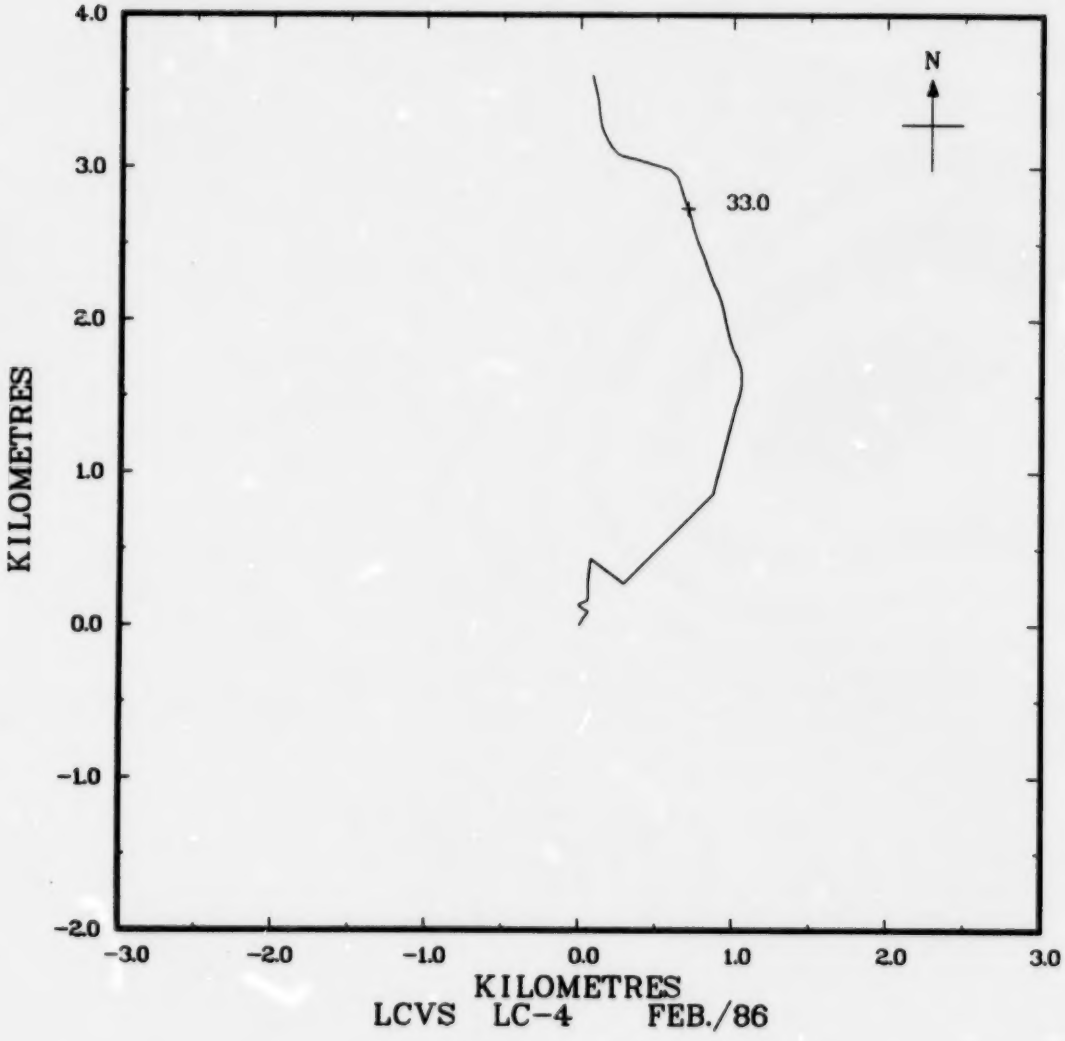
INSTRUMENT TYPE	AANDERAA RCM4
SERIAL NUMBER	6410
LATITUDE	46 59.01 N
LONGITUDE	47 8.33 W
WATER DEPTH (M)	1000
MOORING DATE ; CRUISE	01/02/1986 ; 85-930
DURATION (DAYS)	1.00
SAMPLE INTERVAL	20 MINUTES

SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
SPEED(M/SEC.)	.055	.015	.690	.097	72
E COMP VEL(M/S)	.001	-.030	.486	.065	72
N COMP VEL(M/S)	.042	-.135	.489	.080	72

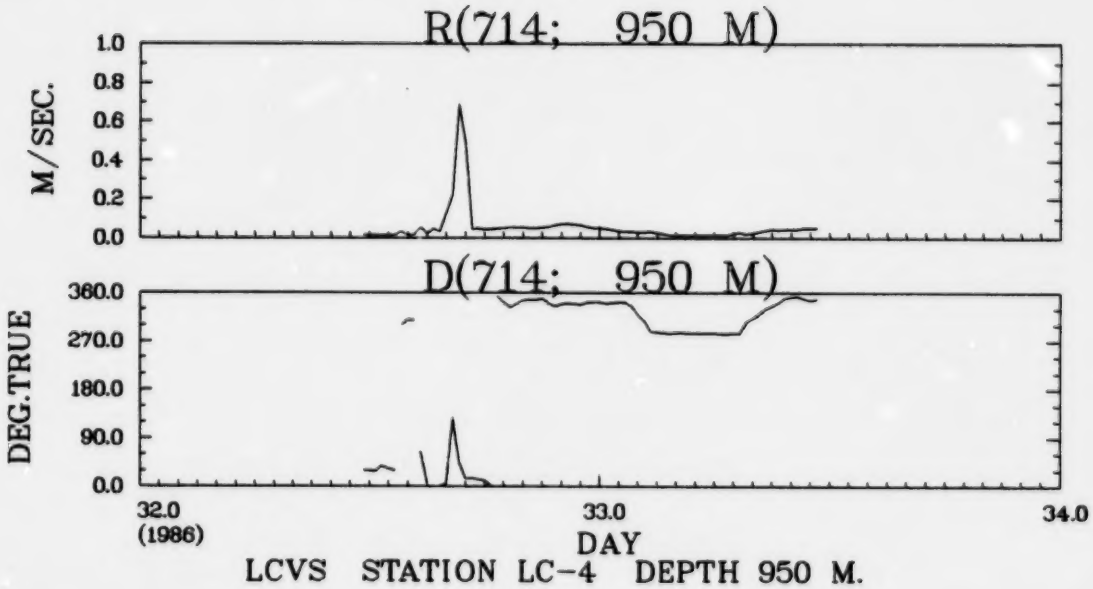
COMMENTS

ORIGINAL MOORING WAS LOST (PRESUMED HOOKED BY FISHING BOAT).
RE-DEPLOYED FOR 1 DAY AT LC-4 SITE (WITHOUT PRESSURE TEMPERATURE OR CONDUCTIVITY SENSORS).

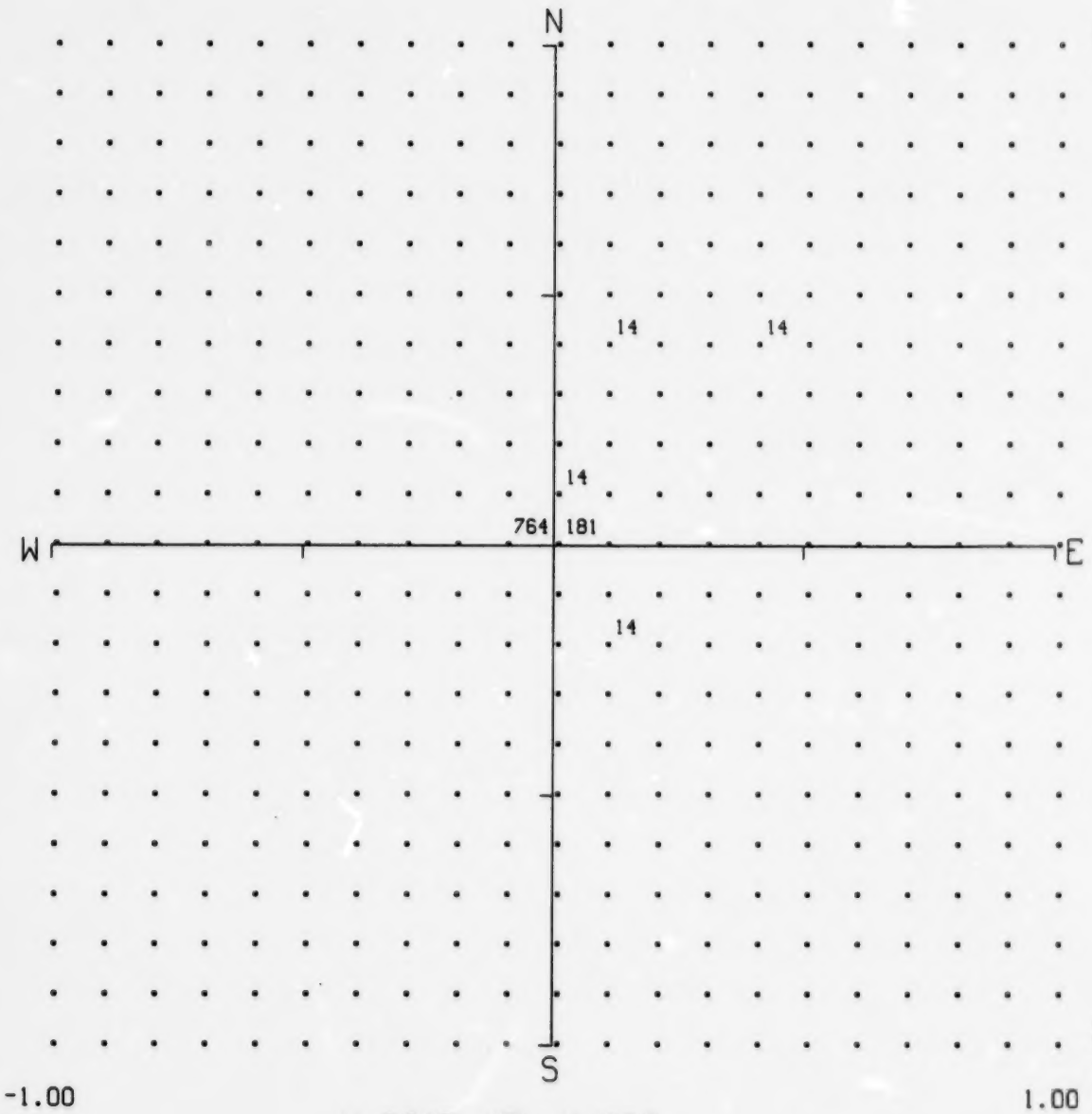
STN. 714, 950 M.



LCVS LC-4 FEB./86



LCVS STATION LC-4 DEPTH 950 M.



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-4 DEPTH 950 M.
START TIME 1/ 2/1986 11:40: .0 GMT
FREQUENCY UNIT 0.1%

MOORING LC-5
DEPTH (M) 20

INSTRUMENT	MARSH McBIRNEY
SERIAL NUMBER	20556
LATITUDE	46 58.85 N
LONGITUDE	47 33.35 W
WATER DEPTH (M)	215
MOORING DATE;CRUISE	10/10/1985 ; 85-930
DURATION (DAYS)	0.00
SAMPLE INTERVAL	20 MINUTES

COMMENTS

THE MARSH McBIRNEY CURRENT METER WAS PIGGY BACKED TO AANDERAA CURRENT METER 5756, BOTH INSTRUMENTS WERE NOT RECOVERED.

MOORING LC-5
DEPTH (M) 45

INSTRUMENT	AANDERAA RCM4
SERIAL NUMBER	1283
LATITUDE	46 58.99 N
LONGITUDE	47 33.35 W
WATER DEPTH (M)	215
MOORING DATE;CRUISE	10/10/1985 ; 85-930
DURATION (DAYS)	0.00
SAMPLE INTERVAL	20 MINUTES

COMMENTS

DATA TOO FULL OF NOISE TO BE OF ANY USE.

MOORING LC-5
DEPTH (M) 95

INSTRUMENT TYPE	AANDERAA RCM4
SERIAL NUMBER	7123
LATITUDE	46 58.99 N
LONGITUDE	47 33.35 W
WATER DEPTH (M)	215
MOORING DATE ; CRUISE	10/10/1985 ; 85-930
DURATION (DAYS)	111.86
SAMPLE INTERVAL	20 MINUTES

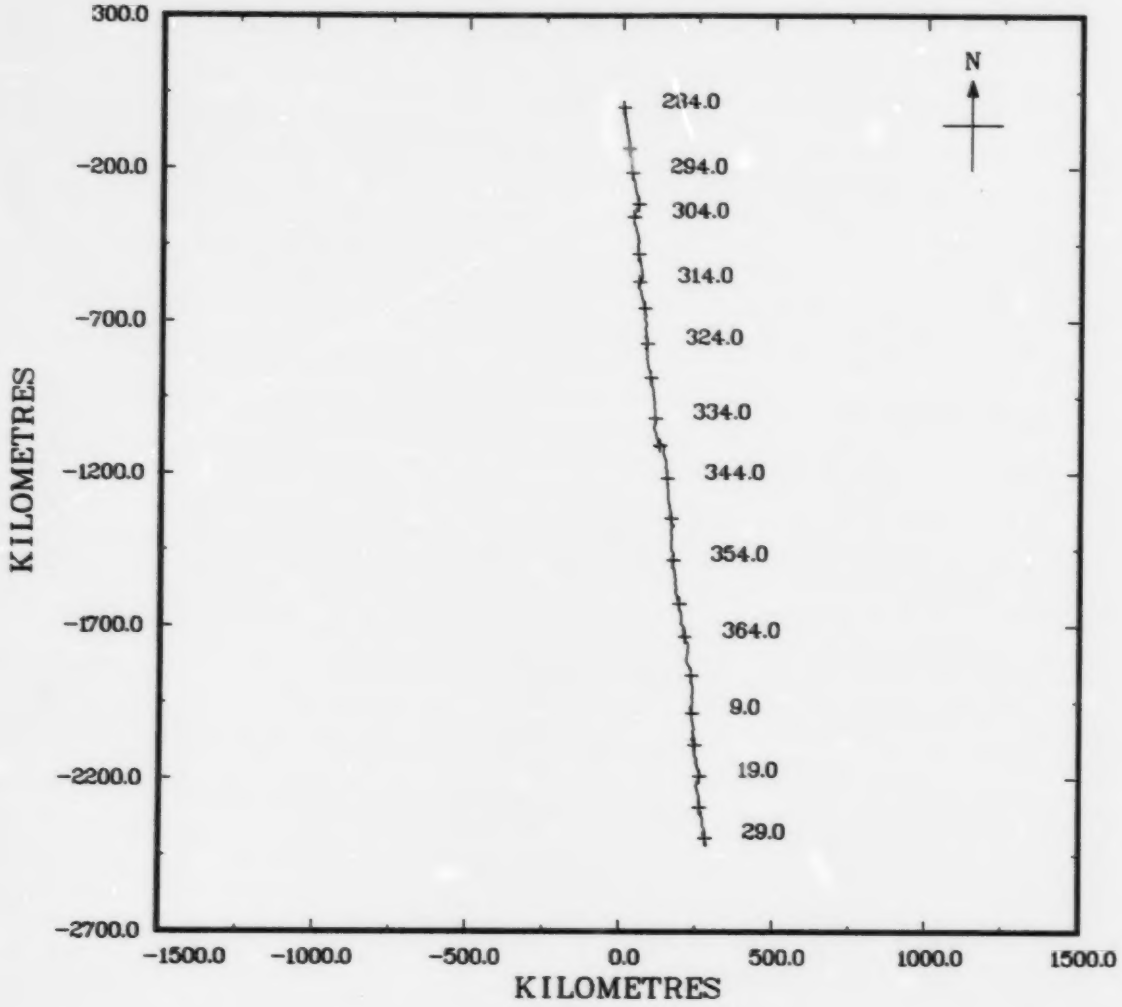
SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
SPEED(M/SEC.)	.283	.075	.597	.088	8054
E COMP VEL(M/S)	.029	-.368	.396	.109	8054
N COMP VEL(M/S)	-.251	-.597	.273	.111	8054
TEMPERATURE(DEG.C.)	-.321	-1.544	4.507	.806	8054
SALINITY	33.249	32.757	33.924	.188	8054
SIGMA-T(KG/M**3)	26.703	26.326	27.177	.137	8054

COMMENTS
---

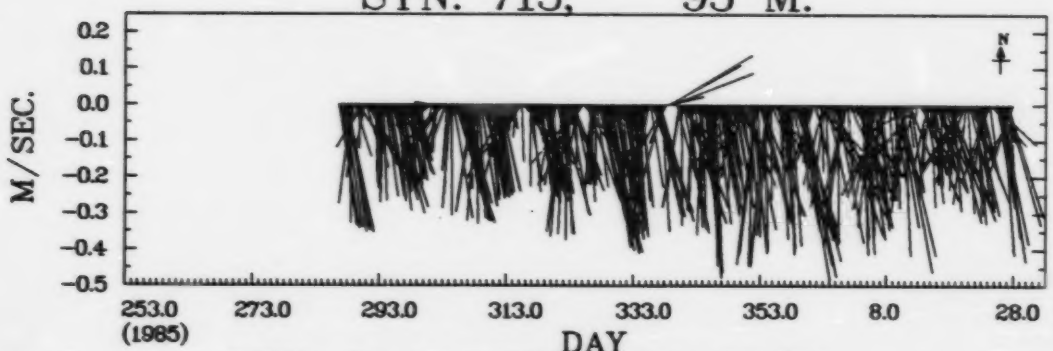
6 HOUR:	SPEED	E COMP VEL	N COMP VEL	TEMPERATURE	SALINITY	SIGMA-T
MEAN	.264	.029	-.251	-.296	33.253	26.705
STD DEV	.085	.061	.095	.683	.164	.117

MOORING WAS DRAGGED ABOUT 1.2 NM OFF POSITION BY FISHING BOAT.
RECOVERED AT 46 59.76N 47 34.67W

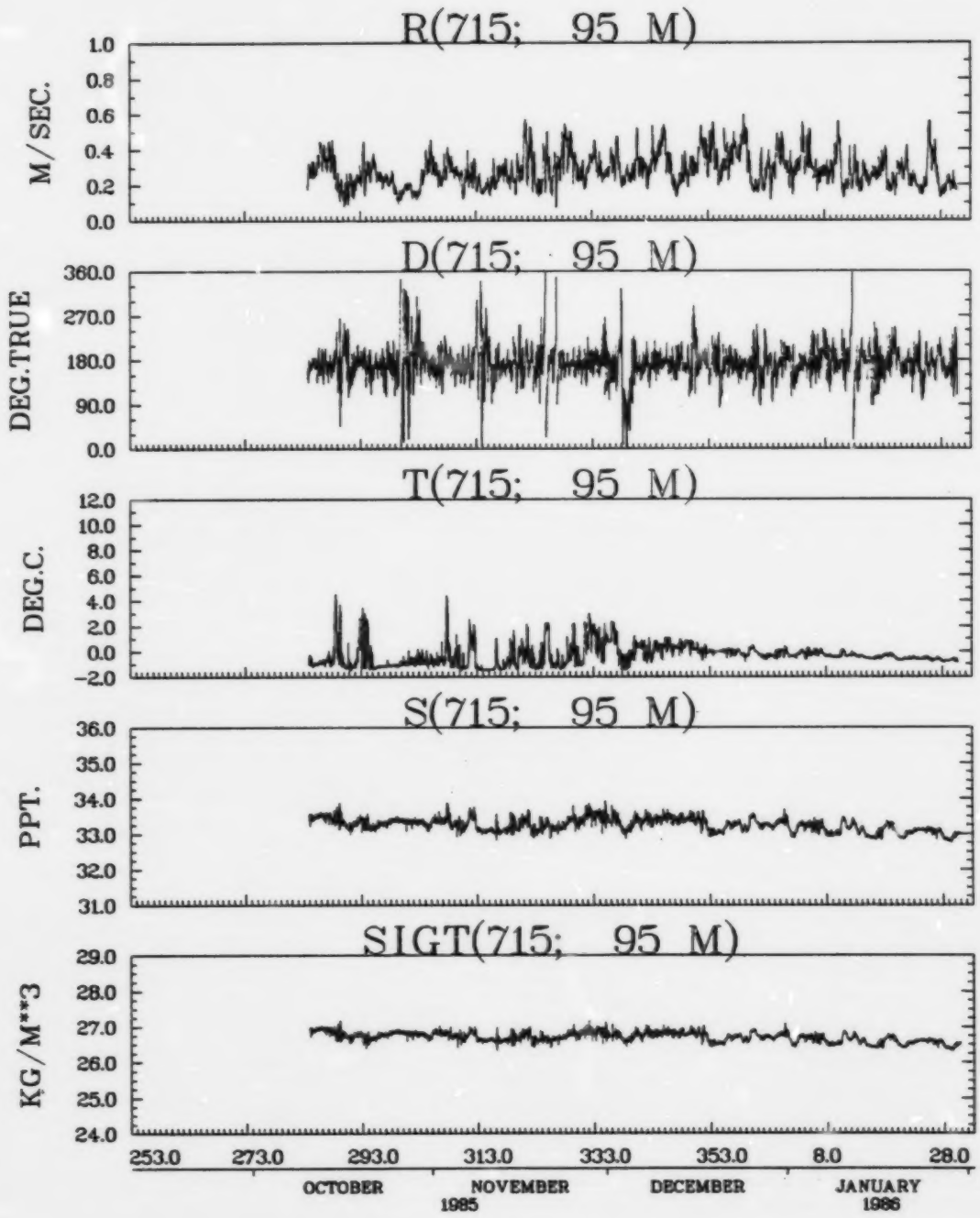
. STN. 715, 95 M.



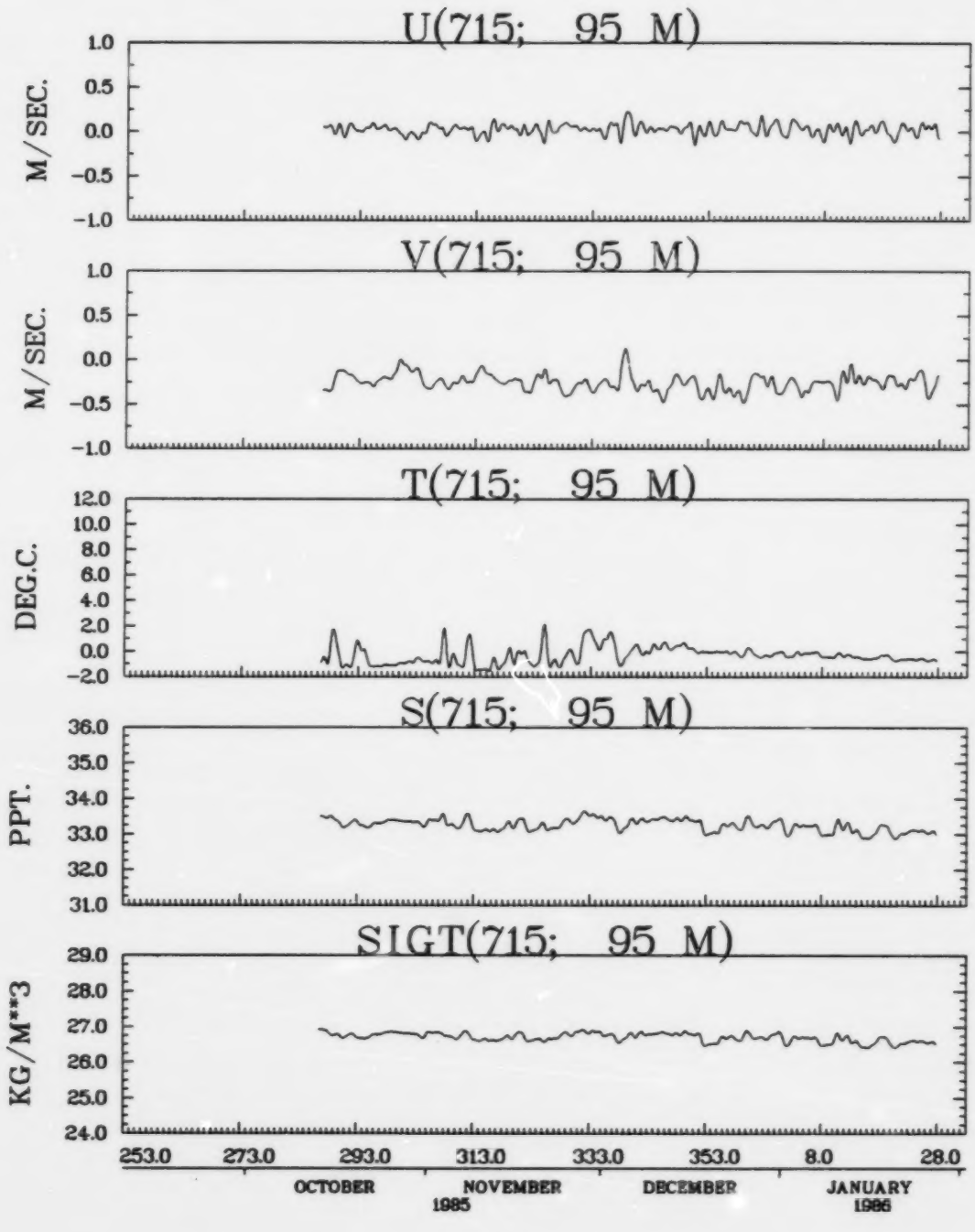
STN. 715, 95 M.



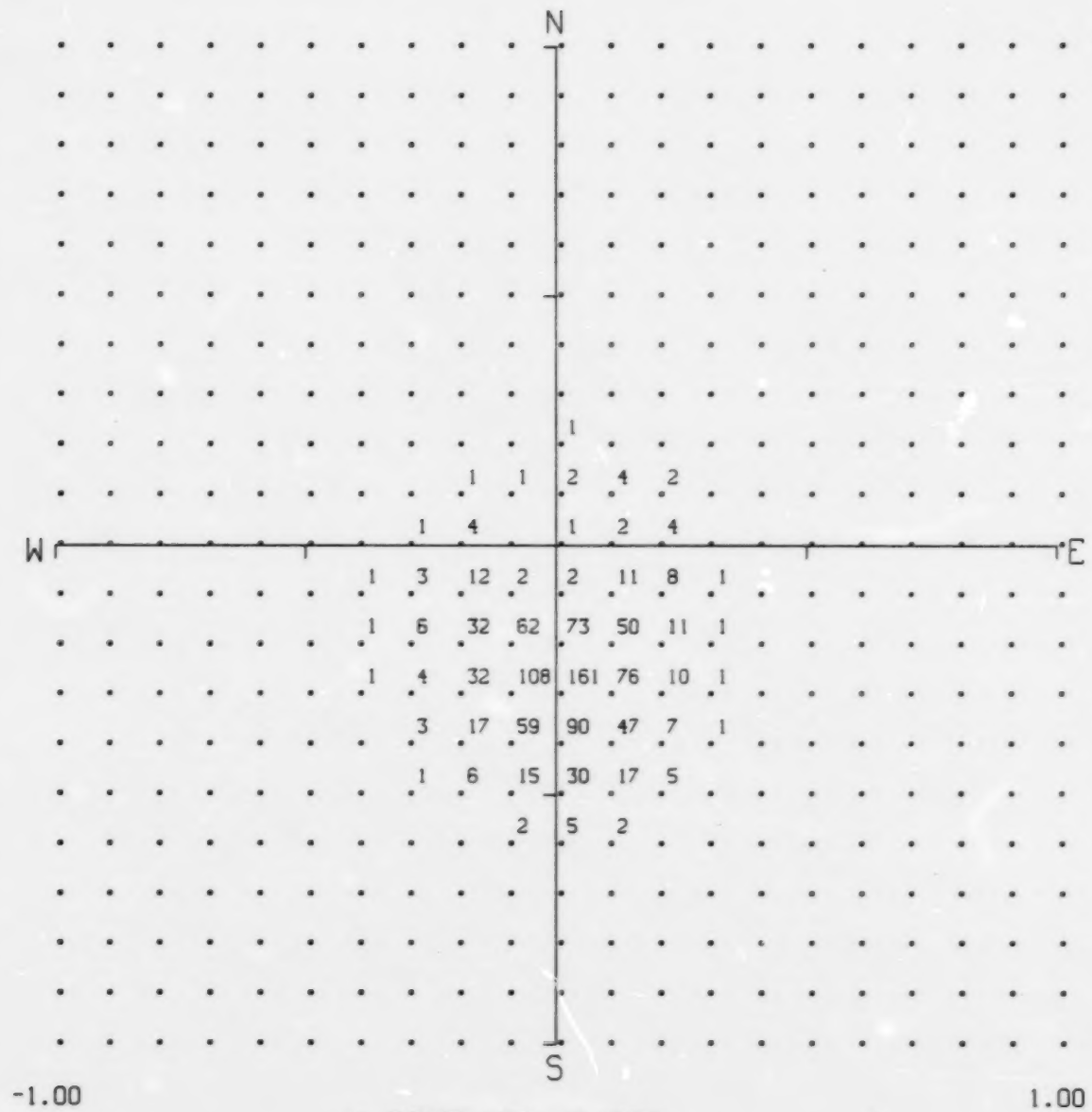
LCVS LC-5 OCT./85 TO JAN./86



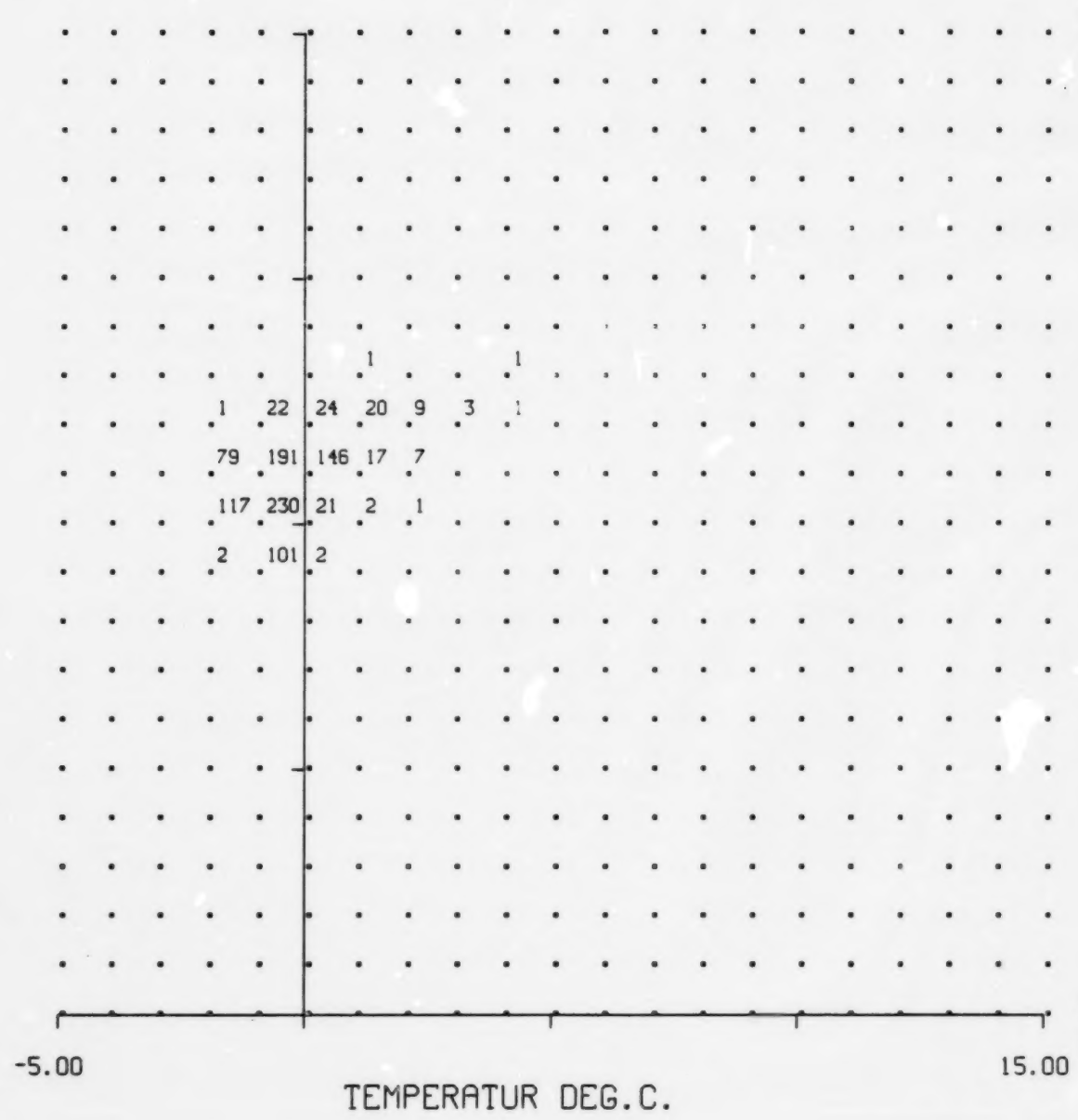
LCVS STATION LC-5 DEPTH 95 M.



LCVS STATION LC-5 DEPTH 95 M.



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-5 DEPTH 95 M.
START TIME 10/10/1985 21:20: .0 GMT
FREQUENCY UNIT 0.1%



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-5 DEPTH 95 M.
START TIME 10/10/1985 21:20: .0 GMT
FREQUENCY UNIT 0.1%

MOORING LC-5
DEPTH (M) 145

INSTRUMENT TYPE	AANDERAA RCM4
SERIAL NUMBER	5569
LATITUDE	46 58.99 N
LONGITUDE	47 33.35 W
WATER DEPTH (M)	215
MOORING DATE ; CRUISE	10/10/1985 ; 85-930
DURATION (DAYS)	10.38
SAMPLE INTERVAL	20 MINUTES

SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
SPEED(M/SEC.)	.238	.074	.439	.077	747
E COMP VEL(M/S)	.027	-.303	.326	.076	747
N COMP VEL(M/S)	-.223	-.421	-.041	.079	747
TEMPERATURE(DEG.C.)	-.652	-1.351	.358	.392	747
SALINITY	33.927	33.565	34.238	.155	747
SIGMA-T(KG/M**3)	27.269	27.000	27.481	.110	747

COMMENTS
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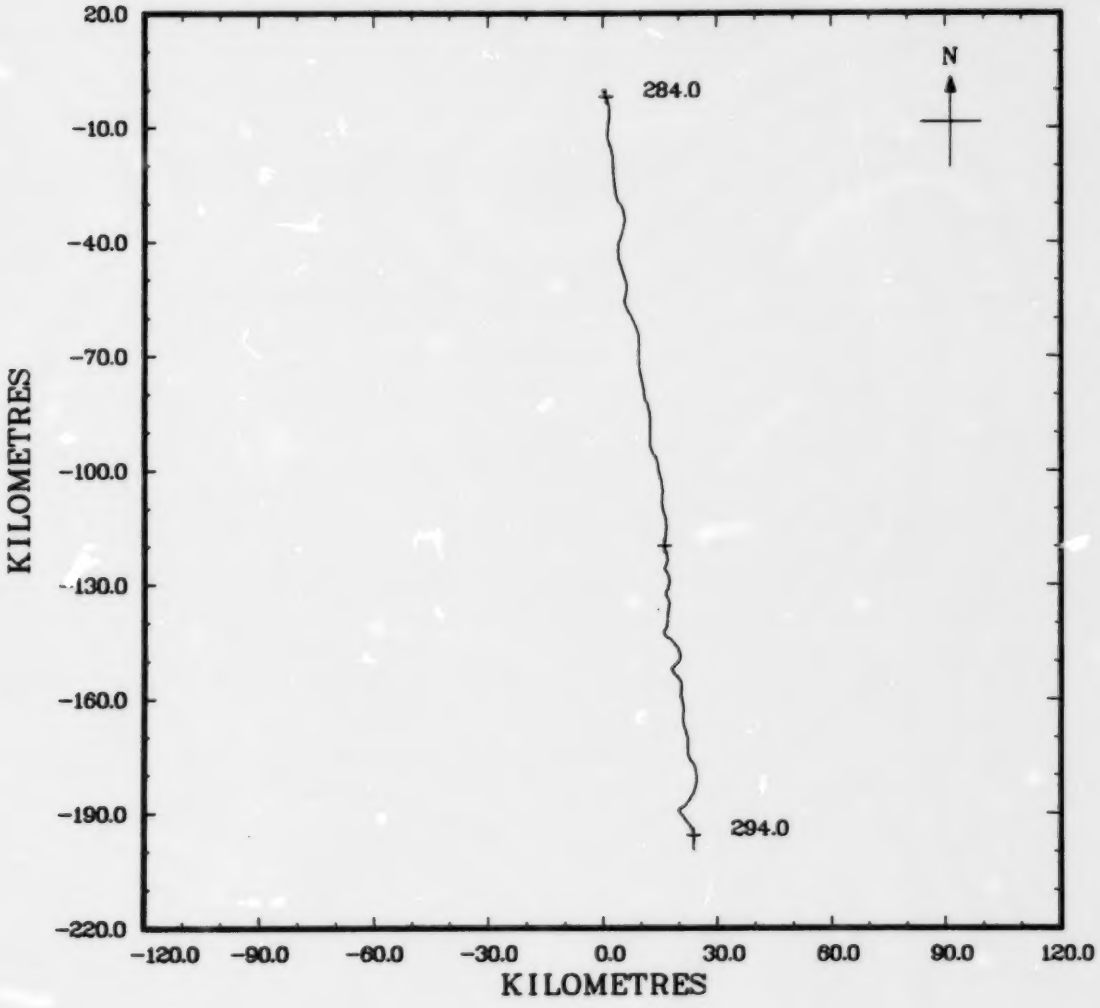
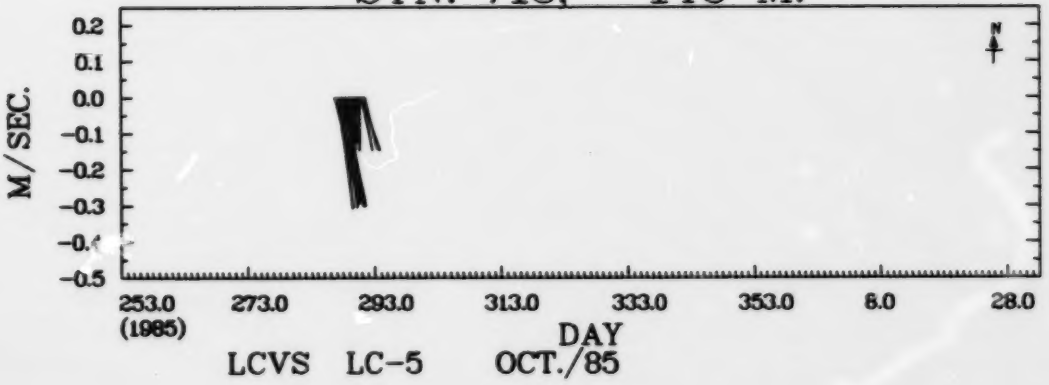
6 HOUR:	SPEED	E COMP VEL	N COMP VEL	TEMPERATURE	SALINITY	SIGMA-T
MEAN	.219	.029	-.216	-.706	33.918	27.264
STD DEV	.079	.026	.078	.325	.117	.081

MOORING WAS DRAGGED ABOUT 1.2 NM OFF POSITION BY FISHING BOAT.
RECOVERED AT 46 59.76N 47 34.67W.
INSTRUMENT FAILED AFTER DAY 294 1985.

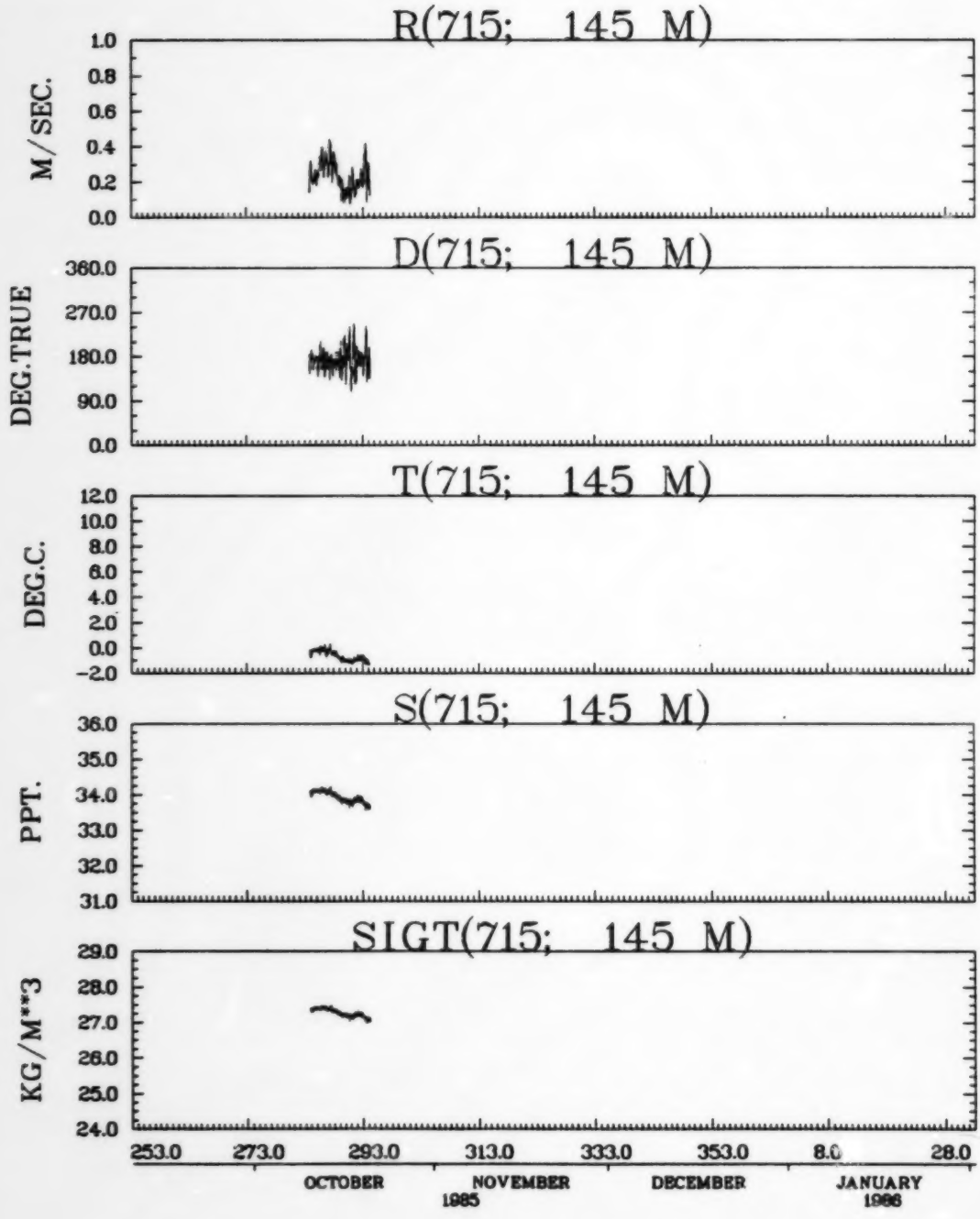
STN. 715, 145 M.



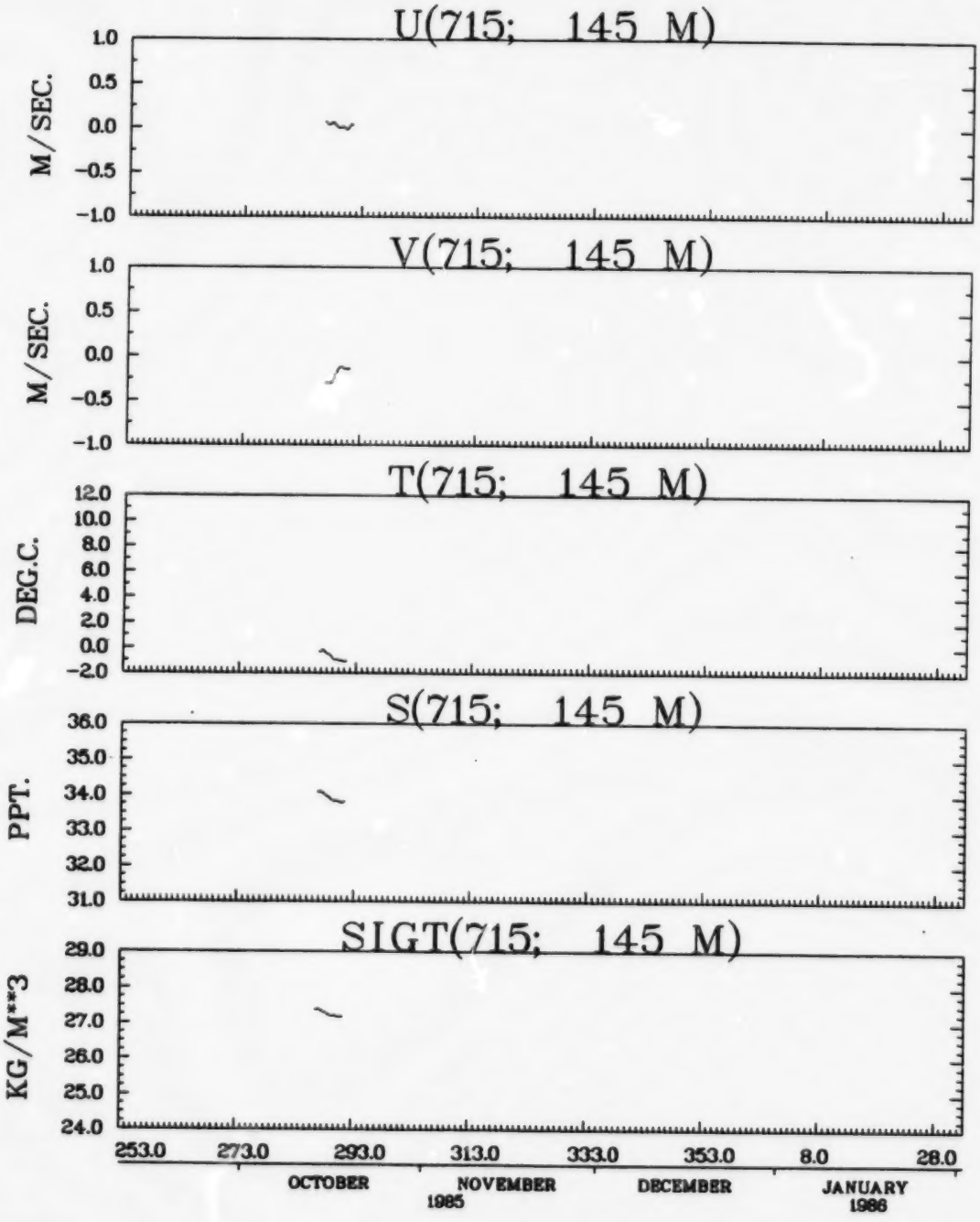
STN. 715, 145 M.



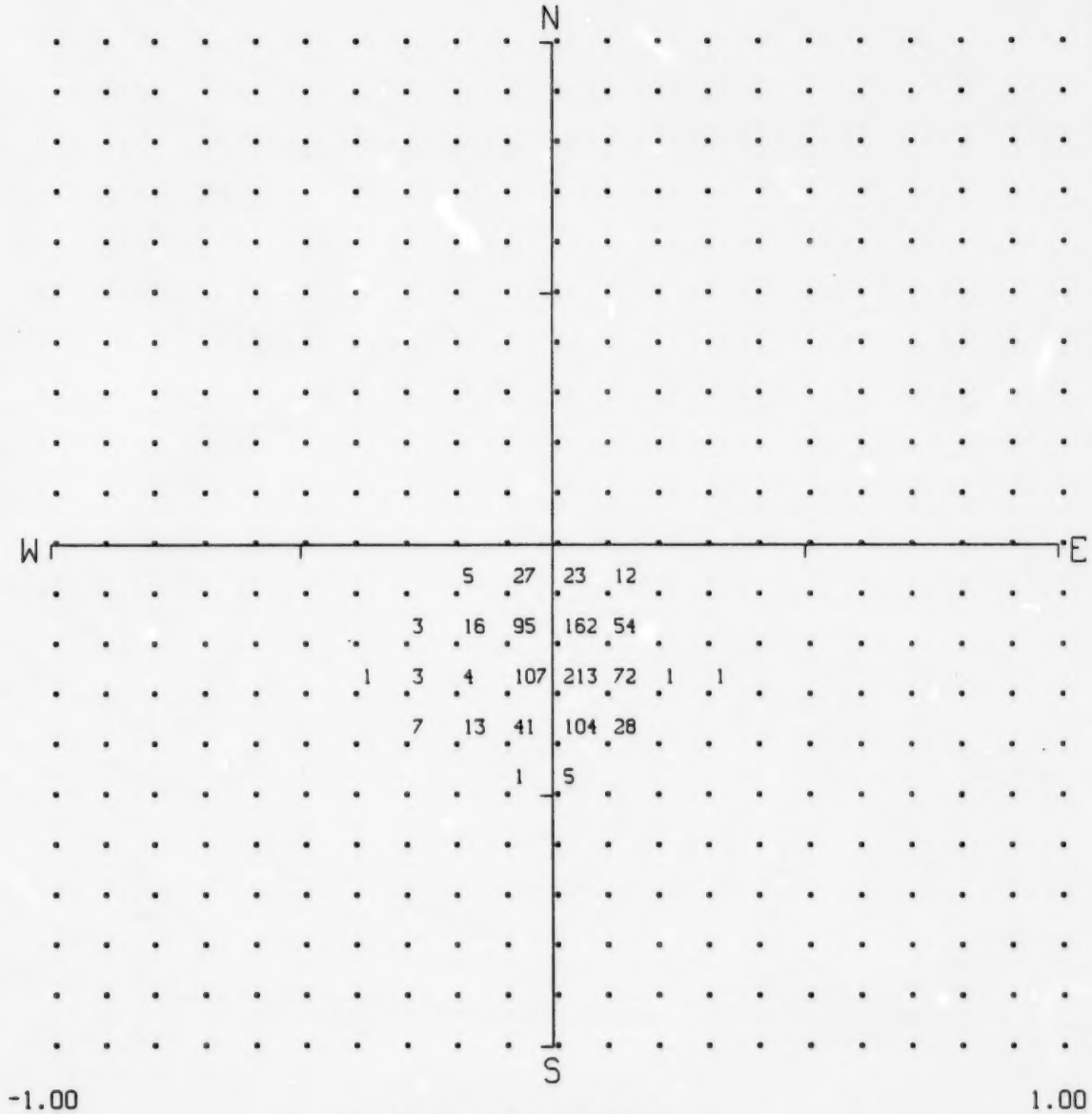
LCVS LC-5 OCT./85



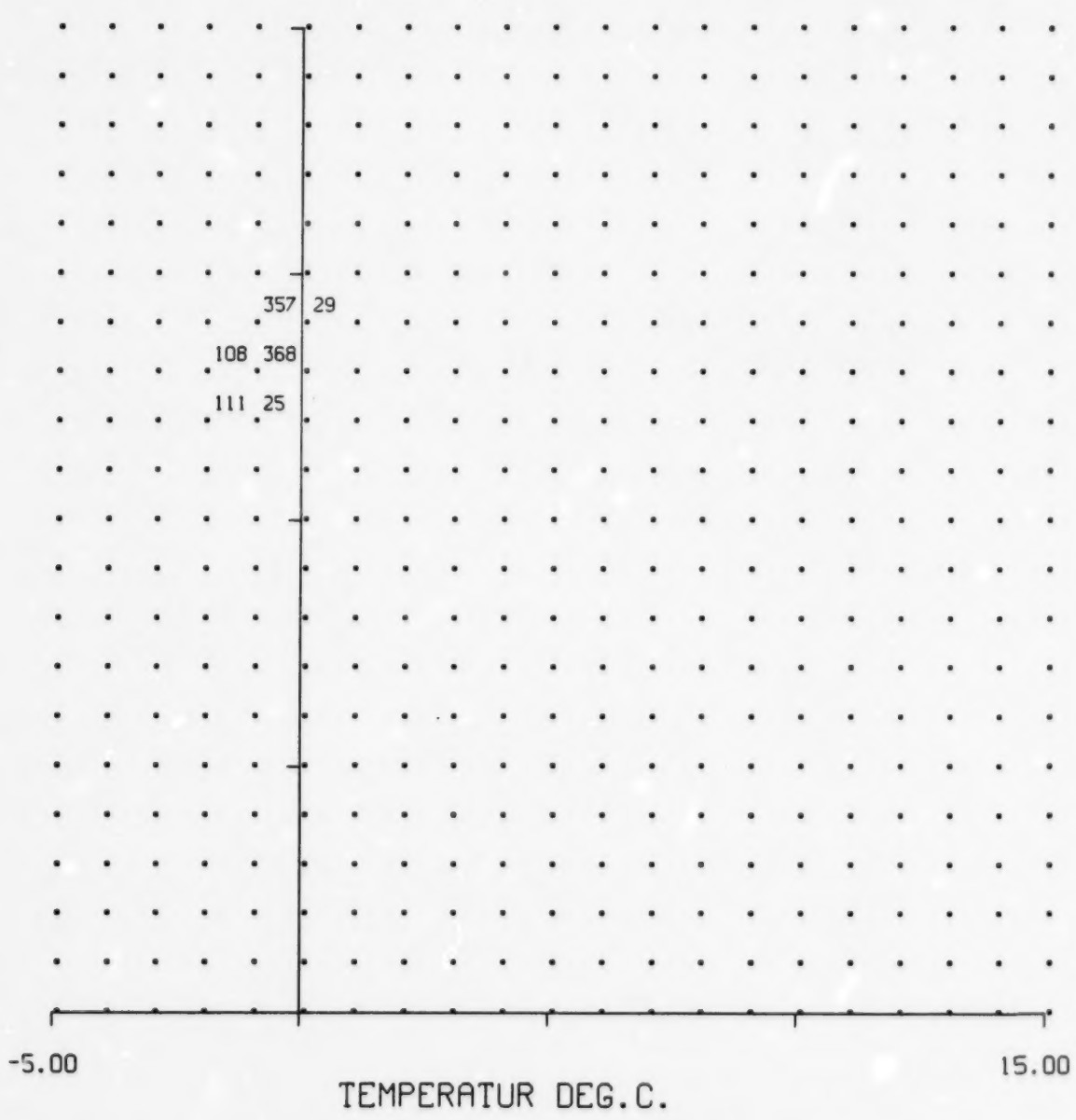
LCVS STATION LC-5 DEPTH 145 M.



LCVS STATION LC-5 DEPTH 145 M.



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-5 DEPTH 145 M.
START TIME 10/10/1985 21:20: .0 GMT
FREQUENCY UNIT 0.1%



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-5 DEPTH 145 M.
START TIME 10/10/1985 21:20: .0 GMT
FREQUENCY UNIT 0.1%

MOORING LC-6
DEPTH (M) 25

INSTRUMENT	MARSH McBIRNEY
SERIAL NUMBER	20031
LATITUDE	46 59.55 N
LONGITUDE	48 00.34 W
WATER DEPTH (M)	140
MOORING DATE;CRUISE	26/10/1985 ; 85-930
DURATION (DAYS)	0.00
SAMPLE INTERVAL	20 MINUTES

COMMENTS

THE MARSH McBIRNEY CURRENT METER WAS PIGGY BACKED TO AANDERAA CURRENT METER 6654, BOTH INSTRUMENTS WERE NOT RECOVERED.

MOORING LC-6
DEPTH (M) 50

INSTRUMENT TYPE	AANDERAA RCM4
SERIAL NUMBER	786
LATITUDE	46 59.77 N
LONGITUDE	48 .40 W
WATER DEPTH (M)	140
MOORING DATE ; CRUISE	26/10/1985 ; 85-930
DURATION (DAYS)	9.06
SAMPLE INTERVAL	20 MINUTES

SENSOR(UNITS)	MEAN	MINIMUM	MAXIMUM	STD DEV.	SAMPLES
TEMPERATURE(DEG.C.)	-.186	-1.655	2.730	1.366	652
SALINITY	33.468	32.941	34.145	.139	652
SIGMA-T(KG/M**3)	26.866	26.377	27.358	.138	652

COMMENTS
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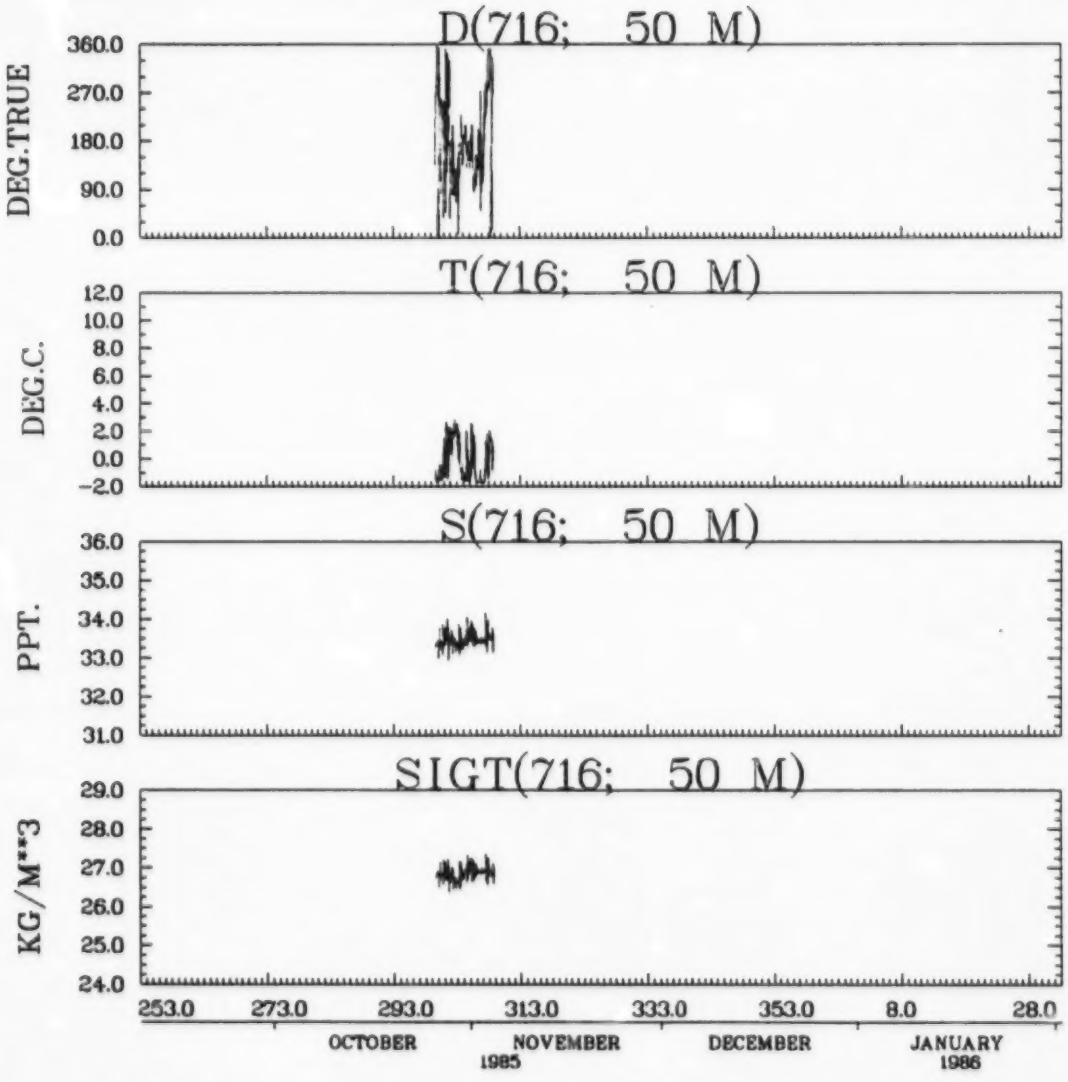
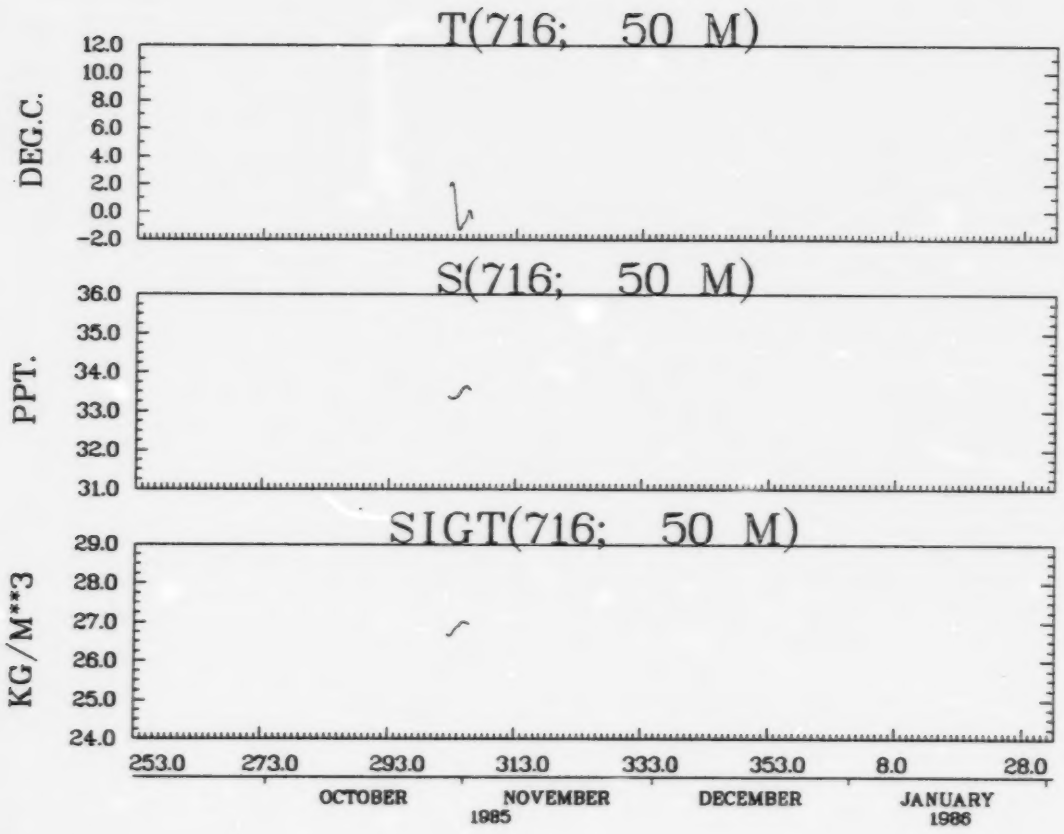
6 HOUR:	TEMPERATURE	SALINITY	SIGMA-T
MEAN	.103	33.470	26.853
STD DEV	1.212	.122	.141

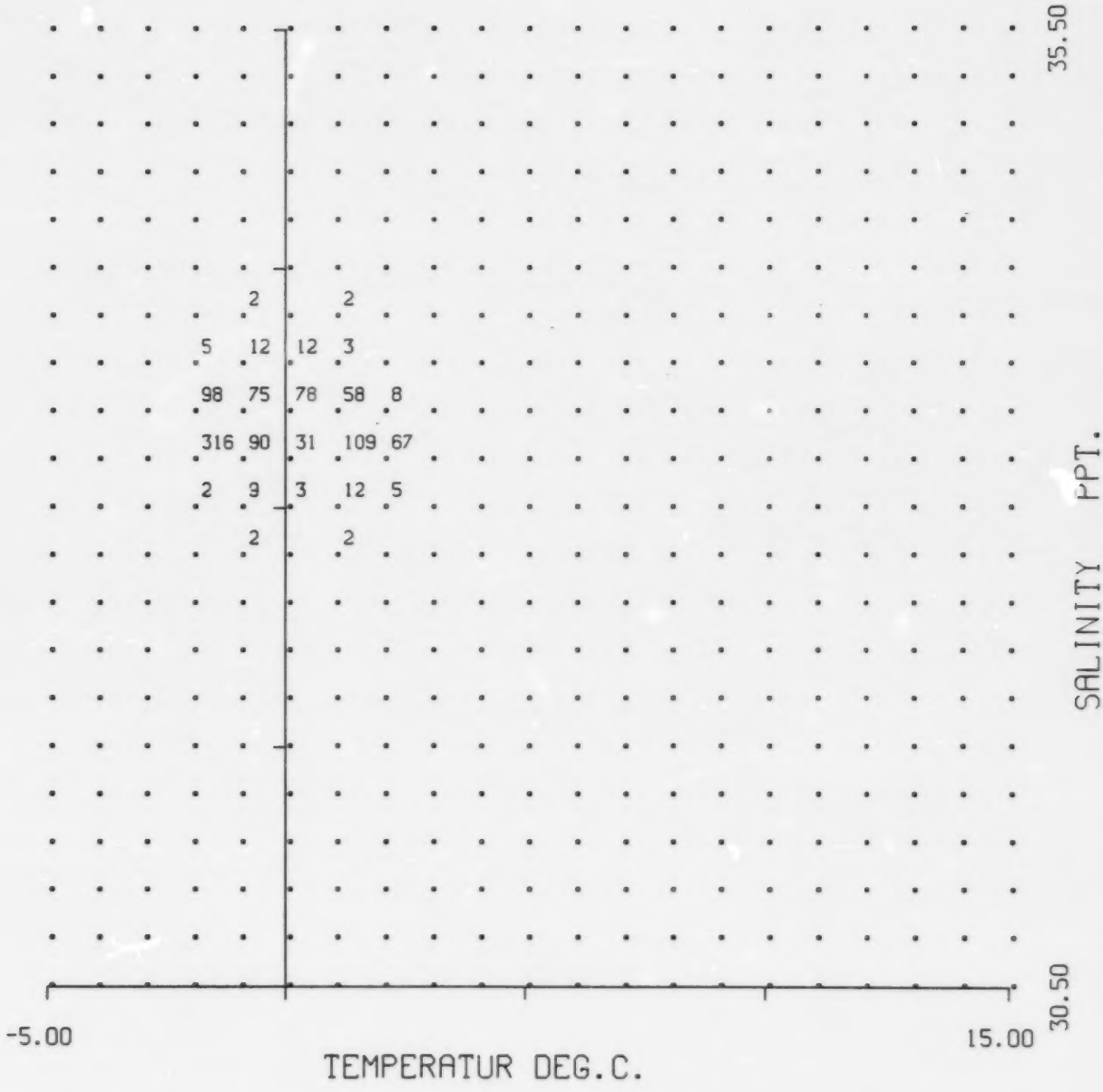
SPEED MALFUNCTIONED FROM BEGINNING.
INSTRUMENT EXPERIENCED TOTAL FAILURE BY DAY 308 1985.



LCVS STATION LC-6 DEPTH 50 M.



LCVS STATION LC-6 DEPTH 50 M.



FREQUENCY DISTRIBUTION PLOT
LCVS STATION LC-6 DEPTH 50 M.
START TIME 26/10/1985 15:20: .0 GMT
FREQUENCY UNIT 0.1%

MOORING LC-6
DEPTH (M) 100

INSTRUMENT	AANDERAA RCM4
SERIAL NUMBER	2663
LATITUDE	46 59.77 N
LONGITUDE	48 00.40 W
WATER DEPTH (M)	140
MOORING DATE;CRUISE	26/10/1985 ; 85-930
DURATION (DAYS)	0.00
SAMPLE INTERVAL	20 MINUTES

COMMENTS

INSTRUMENT MALFUNCTIONED FROM BEGINNING.